



—THE—
PRESCRIPTION.

OTTO A. WALL, M.D.

To
Prof Francis H. Williams MD
with the compliments
of the Author
W. S. Wall.

St. Louis Sept 13. 88.

THE PRACTICE

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THE PRESCRIPTION.

THERAPEUTICALLY, PHARMACEUTICALLY,
AND GRAMMATICALLY CONSIDERED.

BY

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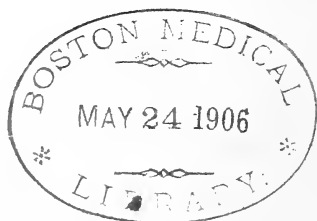
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P R E F A C E .

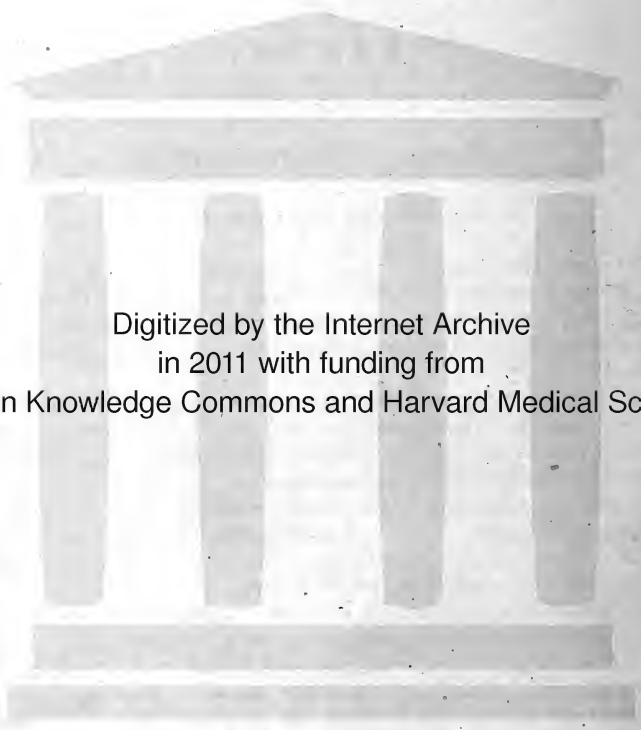
A theoretical and practical knowledge of the construction of the prescription is of great importance to the physician as well as to the pharmacist, as it is so important a feature in the daily life of each.

A knowledge of prescription writing is of importance to the physician, because the style of his prescription is usually considered to furnish a fair index or gauge to his professional accomplishments and knowledge. And generally it is, perhaps, but fair to assume that the physician who is neat, careful, and correct in writing his prescriptions is also careful and painstaking in the examination and treatment of his patients, while he who is slovenly and careless in writing his prescriptions will probably allow the same characteristics to prevail in his treatment.

Correct prescription writing is an accomplishment which is to the physician what elegant clothes are to a gentleman, or a handsome frame to a fine painting. If it is not an essential part of his education, it at least displays his other acquirements to best advantage.

A thorough knowledge of the prescription in all its relations is equally important to the pharmacist, as such knowledge raises him in the estimation of those physicians with whom he comes in professional or social contact. It also makes him a better dispensing pharmacist.

It is hoped that the following treatise on the prescription may prove of interest as well as profit to the readers, and that it may aid, in however humble a way, to promote the cause of medical and pharmaceutical education.



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PART I.

GENERAL CONSIDERATIONS.

MEANING OF "PRESCRIPTION."

The word "prescription" is derived from the Latin word *præscriptum*, which in turn is derived from *præscriptus*, a, um, the perfect participle of the verb *præscribo*, *præscribere*, compounded from the preposition *præ*, meaning "before," and the verb *scribo*, meaning "I write."

The word *præscriptum*, therefore, means "that which is written before," and the word "prescription" means a formula or recipe which is written before, or prescribed, for the guidance of any one to follow in compounding any preparation.

Strictly speaking, the Latin word *præscriptio*, onis, f., means a heading or title, or "copy" in the sense in which the word is used by the printer; while the word *præscriptum*, i, n., means a prescription in the sense in which we use that word.

The word *receptum*, i, n., also means a prescription (recipe or receipt), and is derived from the verb *recepto*, 1, to accept, to take up, and refers to the fact that it is generally adopted or taken up in books. It has the same meaning as the word "formula" (*formula*, æ, f., a diminutive of *forma*, æ, f.), which means a prescription or working directions; literally, a "little form" to go by.

The term "prescription" is generally applied only to directions given by a physician for the compounding of medicines for a patient, but is really equally applicable to written directions for the making of a dish of food, or a preparation for technical purposes. In a general sense, any directions given by the physician for the guidance of his patient are called prescriptions; or, rather, it is said the physician prescribed, for example, change of climate, an ocean trip, abstinence from tobacco or alcoholic drinks, or rest, or exercise, or a certain

diet, etc. But in the sense in which the medical and pharmaceutical professions ordinarily employ the term prescription, it means the written direction to the pharmacist for preparing medicines to be administered to the patients; or, in a more popular sense, the whole paper on which the directions are written is called a prescription.

We will use the term ‘‘prescription’’ in the sense in which it is usually understood by the medical and pharmaceutical professions, although under the heading of ‘‘Extemporaneous Prescriptions’’ we must also consider it in its more popular sense, and refer to some other matters, besides the prescription itself, which are usually written on the paper.

SIMPLE AND COMPOUND PRESCRIPTIONS.

Prescriptions, in the sense of being written directions for compounding medicines, are sometimes classed as ‘‘simple’’ and ‘‘compound,’’ the former of which means a prescription for a single ingredient, as when the physician prescribes a bottle of citrate of magnesia, a certain number of cathartic pills, tincture of iron, or any other medicine expressed by writing a single name; while the compound prescription is one in which two or more ingredients are ordered, which are to be combined or compounded by the pharmacist.

While this classification has some practical applications, it is of little importance, and is not generally adopted by writers on this subject. It is mentioned here simply for the sake of completeness, so that the terms may be understood when met with in the course of reading journals or other works where they might occur.

CLASSIFICATION OF PRESCRIPTIONS.

Another method of classifying prescriptions, which is of more practical value than the above, is that of dividing them into *permanent* and *extemporaneous* prescriptions.

PERMANENT PRESCRIPTIONS

are contained in authoritative or recognized standard works, such as the pharmacopœias or dispensatories.

‘‘OFFICIAL’’ AND ‘‘OFFICIAL’’ PRESCRIPTIONS.

When a formula is contained in a pharmacopœia, which is published by authority granted to a commission or committee appointed for that purpose by the government of a country, or, as in our own

country, by a convention of delegates from incorporated medical and pharmaceutical associations and teaching colleges, it is called an "official" formula, meaning that it is done by authority. Of course, it must be understood that such a formula is official only in the country in which the respective pharmacopœia is the accepted authority, while in other countries, if used at all, it is only officinal.

When, however, the formula is contained in such works as the dispensatories, the *Companion*, or any of the numerous formularies, it is called an "officinal" prescription or formula, meaning that the preparation is an approved medicine kept in apothecary shops. The word is derived from the Latin word *officina*, which means "a shop," and, by usage, "an apothecary shop."

Many writers make no distinction between the two words, using them indiscriminately, or using only the term "officinal."

Recently the term "unofficial" has come into general use, to designate the formulæ for those preparations which are in general use as substitutes for the elegant pharmaceutical specialties put up by various firms, such as formulæ for beef, wine, and iron, elixirs, syrups, etc.

Permanent prescriptions include all formulæ for standard galenical preparations, as well as for the thousand-and-one miscellaneous articles which are usually sold in drug stores, such as toilet preparations, perfumes, popular remedies, etc.

IMPORTANCE OF KNOWING THESE PREPARATIONS.

All other things being equal, that physician will be most successful in practice who has the most thorough knowledge of materia medica, and is familiar, not only with a large number of drugs, but also with a great variety of forms in which to dispense them. It enables the physician to adapt his treatment to the peculiarities of his patients, if need be, as well as to the ever-changing forms of disease, and gives him the same advantage in regard to the fickle and capricious likes and dislikes of the individual that is possessed by the thrifty housewife, who, with a little cornmeal, butter, eggs, and milk, knows how to serve a number of appetizing dishes—gruel, cakes, pudding, biscuits, etc.—while another, with the same materials, knows only how to make the monotonous corn-bread, which, however good in itself, becomes disagreeable on account of the want of change. That physician who, by virtue of his better pharmaceutical knowledge, avoids a prescription routine, and shows variety in his remedies as well as in the form of his remedies, will find that he has an advantage which is not easily overestimated.

We will, therefore, consider in these pages the official as well as officinal classes of pharmaceutical preparations.

PHARMACOPŒIAL PREPARATIONS.

This title is sometimes used instead of the term official, and means the same thing. Pharmacopœial or official preparations are made, or should be made, of the same strength throughout the length and breadth of the land, and are, therefore, more generally obtainable than others which are not official.

ABSTRACTS (*Abstractum, i, n.*).

This name is derived from *abstractus, a, um*, the perfect participle of *abstraho, xi, ctum*, meaning to draw from. The word means, according to Webster, "that which comprises or concentrates in itself the essential qualities of a larger thing."

Many, perhaps most, of the advantages of the fluid extracts are offered by the abstracts, these preparations having a definite percentage relation to the crude drugs from which they are made. They are made by totally exhausting the drug with a proper menstruum, adding a certain quantity of sugar of milk, varying according to the amount of extractive matter in the drug, and then evaporating to dryness. Then enough sugar of milk is added to make the product weigh just one-half as much as the crude drug weighed, and the whole is finally reduced to an impalpable powder.

Abstracts are, in fact, powdered extracts of uniformly twice the strength and half the dose of the corresponding fluid extracts. They possess many pharmaceutical, and a number of therapeutical, advantages over many other of the solid preparations of the same drugs.

For the prescriber the definite relation of its dose to that of the corresponding fluid extract (or of the drug itself) is important, for, while each solid or powdered extract has a different relative dose, as compared with that of the fluid extract, the abstract is given in just half the dose, and it is almost instantly soluble and, therefore, equally as easily absorbed as the fluid extract, but has the advantage that it contains no alcohol, and may be dispensed in capsules, which make it tasteless, without materially retarding its solution and absorption.

Many drugs might be dispensed in the form of abstracts besides the following, which are pharmacopœial:

Aconiti Abstractum,	Jalapæ Abstractum,
Belladonnæ Abstractum,	Nucis Vomice Abstractum,
Conii Abstractum,	Podophylli Abstractum,
Digitalis Abstractum,	Senegæ Abstractum,
Hyoscyami Abstractum,	Valerianæ Abstractum,
Ignatiæ Abstractum,	

CERATES (*Ceratum, i, n.*).

The term is derived from *ceratus, a, um*, an adjective signifying waxed; the adjective is derived from *cera, æ, f.*, wax.

Cerate is made by melting 30 parts of white wax with 70 parts of lard, and stirring constantly until cold. This is often called ‘‘simple cerate,’’ or ‘‘wax cerate,’’ and is used as a dressing, or as a vehicle for more active substances. All cerates contain beeswax.

Formerly the title *Acerides* was used to designate a class of plasters, which, as the name implies, were made without wax.

The following cerates are pharmacopœial:

Ceratum,	Cetacei Ceratum,
Camphoræ Ceratum,	Plumbi Subacetatis Ceratum,
Cantharidis Ceratum,	Resinæ Ceratum,
Cantharidis Extracti Ceratum,	Sabinæ Ceratum.

COLLODIONS (*Collodium, i, n.*).

Word derived from *collodes, is* (*κολλωδης*), glue-like; in turn, from *colla, æ, f.* (*κόλλα*), glue.

Collodion is made by dissolving gun-cotton in a mixture of alcohol and stronger ether. Upon evaporation, a tough colloid mass is left; or, if the collodion is painted on the skin, a thin film remains, which protects and supports the parts.

Collodion may be rendered flexible by the addition of a small proportion of castor oil, or, as in the official preparation, castor oil and Canada turpentine, or it may be medicated. The following are pharmacopœial:

Collodium,	Collodium Flexile,
Collodium cum Cantharide,	Collodium Stypticum.

CONFECTIONS (*Confectio, onis, f.*).

According to Webster, ‘‘a preparation of fruits, roots, and the like, with sugar; a sweetmeat; a comfit.’’

Several Latin words are used to designate this class of pharmaceutical preparations. *Confectio, onis, f.*, is like the English word. *Confectum, i, n.* (that which is prepared; from *conficio, feci, factum*—to bring together; to work up together), is generally given as the origin from which the English word is derived. The word means a product of the confectioner’s art, and although it is the official title, it is not exactly expressive of the nature of the preparations. *Confectio amygdalarum*, for instance, means candied almonds.

As the neuter nouns, *decoctum* and *infusum*, were preferred by the Pharmacopœia to the feminine nouns, *decoctio* and *infusio*, it would

seem to have been preferable to adopt, also, the neuter, *confectum*, rather than the feminine, *confectio*. The words *conditio, onis, f.*, or *conditum, i, n.*, have a similar meaning. *Conditio cinæ* means candied wormseed. As used in the Pharmacopœia the word confection means a medicinal powder, mixed with sugar and saccharine fluids to make a pulp, or paste, resembling stiff apple-butter in consistence.

In some of the works on pharmacy the confections are divided into two classes, the conserves (*conserva, æ, f.*), and the electuaries (*electuarium, i, n.*). The conserves are sometimes described to be preparations of moist drugs with dry saccharine substances, while the electuaries are dry powdered drug mixed with moist saccharine substances; but this distinction is not always made, nor is it always practicable, as neither of the official confections would come strictly under either of these headings. The title ‘electuary’ would probably be the most appropriate for the two pharmacopœial confections, which are:

Rosæ Confectio,

Sennæ Confectio.

A thin, viscid electuary was formerly called an *ec̄ligmatium, i, n.*, or *ec̄legma, ec̄legma*, or *ec̄leigma, atis, n.* (*ἐκλείγμα*; from *ἐκλείχω*, to lick up). *Lohoch, loch*, or *looch, n.*, indeclinable, or *linctus, us, m.* (from *lingo, nxi, nctum*, to lick up), were other terms for the same kind of preparation. On account of their viscosity these preparations had to be licked from the spoon with which they were administered, whence the names. Extract of malt, for instance, is a preparation of this kind, although the name was more frequently used for preparations consisting of an impalpable powder mixed with honey or syrup, or with a thick mucilage of acacia, quince seed, salep, starch, iceland moss, or carrageen.

DECOCTIONS (*Decoctum, i, n.*).

From *decoquo, cxi, coctum*, to boil down. The word *decoctio, onis, f.* is also often used as the Latin title for preparations of this kind.

A decoction is prepared by boiling a drug for some time in water and then straining. The strained liquid is called *cola, æ, f.*, *colatura, æ, f.*, *colatum, i, n.*, or *colamentum, i, n.*, in Latin, the preference usually being given to the word *colatura*. All of these words are derived from the verb *colo, l, to strain; to clarify*. The Pharmacopœia directs that an ordinary decoction, the strength of which is not directed by the physician, nor specified by the Pharmacopœia, shall be prepared by the following formula:

Take of

The substance, coarsely comminuted 10 parts.
Water, a sufficient quantity to make 100 parts.

It is, therefore, of 10 per cent strength.

The physician would probably find a mixture of fluid extracts with water to be preferable to a decoction of the same drug in most cases, but the pharmacist would not be justified in substituting such a mixture when the physician prescribes a decoction. Only two decoctions are pharmacopœial:

Cetrariæ Decoctum, Sarsaparillæ Decoctum Compositum.

ELIXIR (*Elixir, iris, n.*).

“Any cordial or substance which invigorates.”—[Webster.] *Elixir, iris, n.*, or *elixirium, ii, n.*, are two forms of this title, either of which may be used, although the Pharmacopœia gives the preference to the first. These words are said to be derived from the verb *elicio, cui, citum*, which means to coax forth, or to elicit. Mr. Charles Rice, chairman of the Committee of Revision and Publication of the Pharmacopœia of the United States, who is an excellent scholar of Oriental languages, gives the following explanation of the word ‘elixir,’ which is published in Professor Lloyd’s work on Elixirs: “The word is proximately derived from the Arabic (*al-iksir*), being composed of the article *al* or *el* and *iksir*. * * * In alchemy it was used to denote the magical transformation powder so much sought after, a pinch of which would convert a whole mass of base metal into gold. * * * In later technical language ‘elixir’ was used to denote various preparations more or less alchemistic, * * * and it designated any compound preparation of supposed ‘sublime’ properties, reputed to prolong life and to ward off disease.’”

Elixirs are palatable fluid preparations containing sugar, wine, or alcohol, and aromatics, by which the taste of nauseous medicines is rendered agreeable, or at least less disagreeable, or in which such medicines are dissolved.

As it was found impracticable to determine which of the many elixirs in common use should be, and which should not be, admitted into the Pharmacopœia, the committee determined to admit only one, which may serve as a palatable vehicle or diluent for other medicines.

Elixirs, if well made, are an elegant and valuable class of preparations, which deserve extensive application in the treatment of disease.

The only pharmacopœial elixir is
Aurantii Elixir.

EXTRACTS (*Extractum, i, n.*).

From *extraho, xi, ctum*, to extract; to draw out. *Extractus, us, m.*, is another, although but rarely used, form of title for this class of preparations.

Extracts are often spoken of as "solid extracts." Formerly, before the introduction of fluid extracts, they were considered to be the best form for the administration of various medicines, and they are, in fact, excellent preparations, even now, especially if it is desirable to administer the medicines in pill form.

Extracts are generally of semi-solid consistence, but a few are dry and may be powdered. They are prepared by exhausting the drug with a proper menstruum, usually by percolation, and then evaporating to a pilular consistence by means of a water-bath. The methods of preparation, as well as the nomenclature of this class of preparations as given in the Pharmacopœia, are somewhat variable and unsatisfactory. Many of the extracts when evaporated to the pilular consistence are to be thoroughly mixed with 5 per cent of glycerin to prevent the extract from becoming hard and dry, but others, similar in every respect as to their nature, have no glycerin in them. The Pharmacopœia has three extracts designated as "alcoholic extracts" (*extractum alcoholicum*), namely, of belladonna, conium, and hyoscyamus. We would reason from the name that they are to be made with an alcoholic menstruum; that of conium is made with diluted alcohol, the other two with 200 parts of alcohol to 100 parts of water.

But there are several extracts made with equally strong or stronger alcoholic menstrea, which are not called "alcoholic;" extracts of digitalis and leptandra are made with 200 parts of alcohol to 100 parts of water; extracts of iris, podophyllum, and rhubarb are made with 3 parts of alcohol to 1 part of water; extract of nux vomica is made with 8 parts of alcohol to 1 part of water; and extracts of cannabis indica, mezereum, and physostigma are made with pure alcohol; yet none of these are called alcoholic. The alcoholic extract of belladonna is absolutely identical with the extract of digitalis in consistence, methods of preparation, and proportions of alcohol and glycerin, yet the first is called an alcoholic extract, and the other not. Both of these extracts contain glycerin, but, without any apparent reason for different treatment, the alcoholic extract of hyoscyamus is without glycerin. It is apparent, therefore, that the use of the word "alcoholic" to designate a kind of extract is absolutely without meaning, and, therefore, superfluous, and worse than useless.

Similar criticism applies to the term "aqueous extract" (*extractum aquosum*). There is one extract designated thus in the Pharmacopœia, namely, the "aqueous extract of aloes." If this is due to the fact that it is made with water as a menstruum, then the extracts of gentian, glycyrrhiza, hæmatoxylon, krameria, malt, opium, quassia, and taraxacum, which are made with pure water as a menstruum, the pure extract of glycyrrhiza, made with ammoniated water, and the extract of colchicum root, made with acidulated water, should also be called "aqueous extracts."

Some of these are dry; others of pilular consistence; and of these latter some have glycerin added, others not.

If the extract of aloes is called "aqueous" because it is made with water and without glycerin, then the extracts of colchicum, gentian, glycyrrhiza, hæmatoxyton, krameria, malt, and taraxacum are aqueous; if because it is made with water and evaporated to dryness, then the extracts of glycyrrhiza, hæmatoxyton, and krameria, which are dry, should also be called aqueous.

It appears, therefore, that the official title "aqueous extract" has no particular meaning, and that the word "aqueous" is superfluous and useless.

In prescribing extracts, the words "alcoholic" and "aqueous" may be omitted, as they are in the following list of the pharmacopœial extracts, although the addition of the syllables "Alc." and "Aq." in parentheses after the name of the preparation indicates the full official name. The letter "g." in parentheses means that the preparation contains 2 per cent glycerin; "pil." in parentheses means, of pilular consistence; and "dry" in parentheses means that the extract is evaporated to total dryness.

Aconiti Extractum (g. pil.),	Glycyrrhizæ Extractum Purum (pil.),
Aloes Extractum (Aq.—dry),	
Arnicae Radicis Extractum (g. pil.),	Hæmatoxyli Extractum (dry),
Belladonnæ Extractum (Alc.—g. pil.),	Hyoscyami Extractum (Alc.—pil.),
Cannabis Indicæ Extractum (pil.),	Iridis Extractum (pil.),
Cinchonæ Extractum (g. pil.),	Juglandis Extractum (g. pil.),
Colchici Radicis Extractum (pil.),	Krameria Extractum (dry),
Colocynthis Extractum (dry),	Leptandræ Extractum (g. pil.),
Colocynthis Extractum Compositum (dry),	Malti Extractum (thick fluid),
Conii Extractum (Alc.—g. pil.),	Mezerei Extractum (pil.),
Digitalis Extractum (g. pil.),	Nucis Vomicae Extractum (pil.),
Ergotæ Extractum (pil.),	Opii Extractum (g. pil.),
Euonymi Extractum (g. pil.),	Physostigmatis Extractum (pil.),
Gentianæ Extractum (pil.),	Podophilli Extractum, (pil.),
Glycyrrhizæ Extractum (dry),	Quassia Extractum (g. pil.),
	Rhei Extractum (pil.),
	Stramonii Extractum (pil.),
	Taraxaci Extractum (pil.).

FLUID EXTRACTS (*Extractum Fluidum*).

This class of preparations is directed to be made by percolation in the proportion of 1 gram of drug with enough of the proper menstruum to make 1 cubic centimeter of the finished fluid extract.

This plan of making the finished product have a definite volumetric relation to the drug has so many advantages for the prescriber that the writer hopes to see it adopted for all fluid preparations in the Pharmacopœia of 1890.

If properly made by repercolation from the best quality of drugs, these preparations are by far the best, most permanent, and most reliable that can be made to represent the vegetable drugs.

They are promptly active and easily absorbed; they represent the crude drugs more fairly than many of the isolated active principles, alkaloids, etc., and they deserve to be even more generally employed than now. They render tinctures, wines, infusions, decoctions, and a number of other preparations superfluous, and are sure to become the most popular of all pharmaceutical preparations, if they are not so already.

Almost any vegetable drug may be made into a fluid extract by using the official process, choosing, of course, a proper menstruum, according to the nature of the drug.

The following is a list of the pharmacopœial fluid extracts:

Aconiti Extractum Fluidum,	Cypripedii Extractum Fluidum,
Arnicae Radicis Extractum Fluidum,	Digitalis Extractum Fluidum,
Aromaticum Extractum Fluidum,	Dulcamaræ Extractum Fluidum,
Aurantii Amari Extractum Fluidum,	Ergotæ Extractum Fluidum,
Belladonnæ Extractum Fluidum,	Erythroxylî Extractum Fluidum,
Brayeræ Extractum Fluidum,	Eucalypti Extractum Fluidum,
Buchu Extractum Fluidum,	Eupatorii Extractum Fluidum,
Calami Extractum Fluidum,	Frangulæ Extractum Fluidum,
Calumbæ Extractum Fluidum,	Gelsemii Extractum Fluidum,
Cannabis Indicæ Extractum Fluidum,	Gentianæ Extractum Fluidum,
Capsici Extractum Fluidum,	Geranii Extractum Fluidum,
Castanæ Extractum Fluidum,	Glycyrrhizæ Extractum Fluidum,
Chimaphilæ Extractum Fluidum,	Gossypii Radicis Extractum Fluidum,
Chiratæ Extractum Fluidum,	Grindeliæ Extractum Fluidum,
Cimicifugæ Extractum Fluidum,	Guaranæ Extractum Fluidum,
Cinchonæ Extractum Fluidum,	Hamamelidis Extractum Fluidum,
Colchici Radicis Extractum Fluidum,	Hydrastis Extractum Fluidum,
Colchici Seminis Extractum Fluidum,	Hyoseyami Extractum Fluidum,
Conii Extractum Fluidum,	Ipecacuanhæ Extractum Fluidum,
Cornus Extractum Fluidum,	Iridis Extractum Fluidum,
Cubebæ Extractum Fluidum,	Krameriæ Extractum Fluidum,
	Lactucarii Extractum Fluidum,
	Leptandræ Extractum Fluidum,
	Lobeliæ Extractum Fluidum,
	Lupulini Extractum Fluidum,

Matico Extractum Fluidum,	Sarsaparillæ Extractum Fluidum,
Mézerei Extractum Fluidum,	Scillæ Extractum Fluidum,
Nucis Vomicae Extractum Fluidum,	Scutellariæ Extractum Fluidum,
Pareiræ Extractum Fluidum,	Senegæ Extractum Fluidum,
Pilocarpi Extractum Fluidum,	Sennæ Extractum Fluidum,
Podophylli Extractum Fluidum,	Serpentariæ Extractum Fluidum,
Pruni Virginianæ Extractum Fluidum,	Spigeliæ Extractum Fluidum,
Quassiæ Extractum Fluidum,	Stillingiæ Extractum Fluidum,
Rhei Extractum Fluidum,	Stramonii Extractum Fluidum,
Rhois Glabræ Extractum Fluidum,	Taraxaci Extractum Fluidum,
Rosæ Extractum Fluidum,	Tritici Extractum Fluidum,
Rubi Extractum Fluidum,	Uvæ Ursi Extractum Fluidum,
Rumicis Extractum Fluidum,	Valerianæ Extractum Fluidum,
Sabinæ Extractum Fluidum,	Veratri Viridis Extractum Fluidum,
Sanguinariæ Extractum Fluidum,	Viburni Extractum Fluidum,
Sarsaparillæ Extractum Fluidum	Xanthoxyli Extractum Fluidum,
Compositum,	Zingiberis Extractum Fluidum.

GLYCERITES (*Glyceritum*, *i*, *n.*).

These preparations are mixtures of various substances or medicines with glycerin. The two official glycerites are used mainly as vehicles for other remedies, but quite a number are in common use which are medicated. These preparations have also been designated as glycerolates (*glycerolatium*, *i*, *n.*), glycerols or glyceroles (*glyceroleum*, *i*, *n.*), glycerins (*glycerinum*, *i*, *n.*), or glycerates (*glyceratum*, *i*, *n.*).

In appearance and physical properties, as well as to some extent in their therapeutical uses, they resemble the medicated syrups, but as glycerin, which forms the bulk of these preparations, is antiseptic, these preparations will keep in good condition for an indefinite length of time, and the antiseptic effects of glycerin on the system may also prove of therapeutical value.

The official glycerites are:

Amyli Glyceritum,	Vitelli Glyceritum.
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HONEYS (*Mel*, *mellis*, *n.*).

Honey, medicated or simple, is occasionally used in pharmacy, or in prescriptions, generally as an excipient.

The official honeys are:

Mel,	Rosæ Mel.
Mel Despumatam,	

Oxymel, *mellis*, *n.*, *oxymeli*, *itis*, *n.* (*oxy*—, ὀξύς, a prefix meaning

sharp or acid), and *acetomel, mellis, n.*, are terms for a class of preparations consisting of honey with vinegars. *Hydromel, mellis, n.*, is a mixture of honey with water, which, when fermented, was called "mead."

INFUSIONS (*Infusum, i, n.*).

The term is derived from the verb *infundo, fudi, fusum*, to drench with hot water. The noun *infusio, onis, f.*, is also occasionally used in prescriptions instead of the more common neuter noun. Formerly all infusions were made by placing the properly comminuted drug in an appropriate vessel, and pouring boiling water over it, covering it and letting stand until cool and then straining. (See Decoctions.) Infusions may also be made with cold water (*infusum frigide paratum*), and they may be made by percolation.

Formerly a preparation called *infuso-decoctum, i, n.*, was a preparation made by first boiling one or more drugs for awhile, and, when the boiling was completed, adding another ingredient, which was only to be infused.

As both decoctions and infusions have now become almost obsolete, and deservedly so, such refinements of nomenclature are no longer in vogue. Undoubtedly the infusions, as a class, are inferior and unreliable preparations, which should be discarded entirely, and mixtures of fluid extracts and water should be prescribed instead. When they are prescribed, however, it would be poor pharmacy to dispense diluted fluid extracts in their stead.

The Pharmacopœia directs that "an ordinary infusion, the strength of which is not directed by the physician, nor specified by the Pharmacopœia, shall be prepared by the following formula:

Take of

The substance, coarsely comminuted	10 parts.
Boiling water....	100 parts.
Water, a sufficient quantity to make.....	100 parts.

"Put the substance into a suitable vessel, pour upon it the boiling water, cover the vessel tightly, and let it stand two hours. Then strain, and pass enough water through the strainer to make the infusion weigh 100 parts.

"*Caution.*—*The strength of infusions of energetic or powerful substances should be specially prescribed by the physician.*"

The following is a list of the pharmacopœial infusions:

Brayeræ Infusum,	Pruni Virginianæ Infusum,
Cinchonæ Infusum,	Sennæ Compositum Infusum.
Digitalis Infusum,	

LINIMENTS (*Linimentum, i, n.*).

A liquid preparation intended for inunction, and consisting wholly, or in part, of oils, volatile oils, or camphor.

The practice of massage for the cure of rheumatic and other affections is often much facilitated by the use of a liniment, and an attendant may be induced to rub and knead a joint for half an hour with a liniment, when he would not do so with his hands or gloves alone.

A remedy intended for inunction by massage is sometimes known as *confricamentum*, *i*, *n.*, from *confrico*, *fricui*, *frictum*, to rub against each other.

Liniments are a very popular class of remedies for painful affections, and prove of benefit partly on account of their intrinsic anodyne virtues, partly owing to the accompanying employment of friction.

There is also a class of liniments known as *opodeldocs* or soap liniments (*saponamentum*, *i*, *n.*), which consist of soap dissolved in alcohol and water, in such proportions as to gelatinize. With this simple saponament may be incorporated various other substances, such as camphor, opium, etc.

The pharmacopœial liniments are:

Ammoniæ Linimentum,	Chloroformi Linimentum,
Belladonnæ Linimentum,	Plumbi Subacetatis Linimentum,
Calcis Linimentum,	Saponis Linimentum,
Camphoræ Linimentum,	Sinapis Compositum Linimentum,
Cantharidis Linimentum,	Terebinthinæ Linimentum.

MASSES (*Massa*, *æ*, *f.*).

Masses are of a doughy or pilular consistence, intended for the making of pills. They are kept on hand in mass and divided into pills as occasion requires. Three masses are official.

Copaibæ Massa,	Hydrargyri Massa.
Ferri Carbonatis Massa,	

MIXTURES (*Mistura*, *æ*, *f.*).

This is a rather nondescript class of pharmaceutical preparations, including a number which can not be well placed elsewhere.

The term "mixture" should be restricted to those preparations in which a solid substance is suspended in a fluid by means of some viscid excipient, such as syrup or mucilage. The Pharmacopœia includes emulsions in this class, but we will consider them separately a little further on.

The following are the pharmacopœial mixtures:

Ammoniaci Mistura,	Ferri et Ammonii Acetatis Mistura,
Amygdalæ Mistura,	Glycyrrhizæ Composita Mistura,
Asafœtidæ Mistura,	Magnesiæ et Asafœtidæ Mistura,
Chloroformi Mistura,	Potassii Citratis Mistura,
Cretæ Mistura,	Rhei et Sodæ Mistura.
Ferri Composita Mistura,	

EMULSIONS (*Emulsio, onis, f.*) are included in the pharmacopœial class of mixtures. They are liquid preparations, in which oils, oleo-resins, balsams, resins, or similar substances which are insoluble in water, are suspended in water by the aid of some viscid or mucilaginous excipient, sometimes called the emulgent (*emulgens, entis, n.*, the emulsifying agent).

By some English writers the term *emulsion* is used to designate the same class of preparations which the United States Pharmacopœia calls *mixtures*, so that a dry powder suspended in mucilage is classed in this category.

As the term comes from the verb, *emulgeo, mulsi, mulsum*, to milk, the word should be limited to the preparations having an appearance of milk, and we so use it.

Some authors make a distinction between different kinds of emulsions, dividing them into true (*emulsionēs verae*) and false (*emulsionēs spuriae*) emulsions. The true emulsions result from the trituration of a drug containing both the oil and the emulgent, with water, as when *asafœtida* is rubbed up with water to make the official *mistura asafœtidæ*. The false emulsions are made by triturating the substances to be emulsified with gum, mucilage, or yolk of egg or other emulgent, as when we emulsify castor oil with *acacia*. The older writers gave a special name to the false emulsion, calling it *colostrum* (*colostrum, i, n.*, or *colostra, æ, f.*, the first milk of a newly delivered woman).

Of the official mixtures the following are really emulsions:

Ammoniaci Mistura,	Asafœtidæ Mistura,
Amygdalæ Mistura,	Chloroformi Mistura.

MUCILAGES (*Mucilago, inis, f.*; also called *Mucago*, or *Muccago, inis, f.*).

This is a class of preparations consisting of a gum or mucilaginous substance dissolved in water. They are used as demulcents, as vehicles for other medicines, or as excipients.

The following are the titles of the pharmacopœial mucilages:

Acaciæ Mucilago,	Tragacanthæ Mucilago,
Cydoniæ Mucilago,	Ulmi Mucilago.
Sassafras Medullæ Mucilago,	

OINTMENTS (*Unguentum, i, n.*).

Unguentum, i, n., *ungen, inis, n.*, and *unguedo, inis, f.*, are terms derived from *ungo*, or *unguo, unci, unctum*, to anoint, and mean a salve, or fatty substance, which melts by friction at the temperature of the body, and which is intended for inunction. Remedies used in

ointments are usually intended for absorption, although occasionally for local or external effects.

Enchrismata, *atis*, n., or *chrismata*, *atis*, n. ($\chi\rho\iota\sigma\mu\alpha$), also means a salve, but the term more properly means a remedy to be applied with a brush, and a similar term, *enchristum*, *i*, n. ($\epsilon\gamma\chi\rho\iota\sigma\tau\omicron\rho$), means either a salve or liniment, or a remedy for inunction.

Ointments are usually dispensed in small jars, or gallipots, which are designated by various terms in Latin, of which *olla*, *a*, f., pot, was most commonly used. *Ollula*, *a*, f., *ollicula*, *a*, f. (diminutive of *olla*), *myrotheca*, *a*, f. ($\mu\acute{\upsilon}\rho\omicron\sigma\eta\kappa\eta$), and *myrothecium*, *ii*, n., all mean gallipot, or ointment jar.

Nartheceis, *ecis*, f. ($\nu\acute{\alpha}\rho\sigma\eta\zeta$), *nartheceis*, *nartheceis*, or *nartheceis*, *a*, f., and *nartheceum*, *ii*, n., are terms originally meaning a box turned or made out of narthex wood to contain medicine, and these terms afterwards were used to designate ointment jars, although they are equally applicable to a medicine chest.

Alabastrum, *i*, n., was an ointment jar cut from alabaster in the form of a rose bud, and was used for perfumed unguents, or pomades. *Pomata*, *a*, f., and *pomatium*, *i*, n., is a perfumed ointment used for cosmetic purposes.

The following ointments are official:

Acidi Carbolici Unguentum,	Iodi Unguentum,
Acidi Gallici Unguentum,	Iodoformi Unguentum,
Acidi Tannici Unguentum,	Mezerii Unguentum,
Aquæ Rosæ Unguentum,	Picis Liquidæ Unguentum,
Belladonnæ Unguentum,	Plumbi Carbonatis Unguentum,
Chrysarobini Unguentum,	Plumbi Iodidi Unguentum,
Diachylon Unguentum,	Potassii Iodidi Unguentum,
Gallæ Unguentum,	Stramonii Unguentum,
Hydrargyri Unguentum,	Sulphuris Unguentum,
Hydrargyri Ammoniaci Unguentum,	Sulphuris Alkalinum Unguentum,
Hydrargyri Nitratis Unguentum,	Unguentum,
Hydrargyri Oxidi Flavi Unguentum,	Veratrinæ Unguentum,
Hydrargyri Oxidi Rubri Unguentum,	Zinci Oxidi Unguentum.

OLEATES (*Oleatum*, *i*, n.).

Oleates are combinations of various bases with oleic acid, ordinarily dissolved in an excess of oleic acid; or, by double decomposition, the oleates are produced without an excess of oleic acid, the bulk of the preparation then being made up of simple cerate, petrolatum, or other fat.

The oleates are said to be absorbed more readily by the skin, and they are, therefore, preferred to ointments for inunctions. There

are quite a number of oleates supplied to the trade, but only the following are official:

Oleatum Hydrargyri, Oleatum Veratrinae.

OLEORESINS (*Oleoresina*, *æ*, *f.*).

There are quite a number of natural oleoresins which are used in medicines, such as copaiba and others. There is, also, a class of official preparations of this name, which includes oleoresins (a natural combination of a volatile oil with a resin), which are extracted from crude vegetable drugs with ether, which latter is afterwards distilled off or allowed to evaporate.

The following are official:

Aspidii Oleoresina,	Lupulini Oleoresina,
Capsici Oleoresina,	Piperis Oleoresina,
Cubebæ Oleoresina,	Zingiberis Oleoresina.

PAPERS (*Charta*, *æ*, *f.*).

Charta, *æ*, *f.* (*χαρτης*) is a Latin word which has several meanings, of which the most common is paper; but it also means that which is written on paper, an epistle, a deed, a charter (*magna charta*, for instance); and thirdly, a thin plate, as *charta plumbea*, sheet-lead.

Adjectives added to the word *charta*, specify various peculiarities, as *charta bibula*, blotting paper; *charta densata*, paste-board; *charta exploratoria*, reagent paper, or litmus paper; *charta cerata*, waxed paper, etc.

It would, therefore, seem to have been advisable to have called this class of preparations *chartæ medicatæ*, or medicated papers.

Papers are prepared either by saturating bibulous paper with some solution and then drying, or by coating one surface with a mixture of medicinal substances. Nitrate of potassium paper is an example of the first, and mustard paper of the second kind.

There are three official papers:

Cantharidis Charta,	Sinapis Charta.
Potassii Nitratis Charta,	

PILLS (*Pilula*, *æ*, *f.*).

The word *pilula* is a diminutive of *pila*, *æ*, *f.*, which means a mortar, a pile (as *pila electrica*, a galvanic pile), a ball, or a sphere. The term *pilula*, however, only means a little sphere, or, a pill.

Many remedies can appropriately be dispensed in pill form, and this

class of preparations is quite popular. Nevertheless, this method of administering medicines has serious drawbacks, owing to the frequent insolubility of the pill and the consequent want of absorption. It is true, that this is not always due to the pill itself, but to the condition of the patient, but the result is the same; often pills will fail to act when the corresponding remedies in a fluid state, as in fluid extract, would act promptly. The applicability of pills is, therefore, limited, and careful physicians will rather prescribe remedies in a form more easily and surely absorbed.

Pills are used plain, or uncoated; sugar-coated, or gelatin-coated. Of these three forms, the uncoated pill, probably, is most readily absorbed, but the coating of the gelatin-coated pill is also so easily dissolved that there is not much therapeutical disadvantage in giving the gelatin-coated rather than the uncoated pills, while there are a number of advantages which far outweigh the very slight retardation of solution, of which the permanence and tastelessness are two. The sugar-coated pill is least soluble of the kinds mentioned.

Some few pills containing deliquescent salts, as iodide of iron, etc., are coated by rolling on a plate in a solution of balsam of tolu in ether, the ether leaving a resinous coating upon evaporation. These pills are possibly less readily absorbed than the sugar-coated pills, but, as the latter are often coated in a similar way with a solution of shellac in alcohol before being coated with sugar, so as to prevent the sugar from being discolored by the pill mass, such sugar-coated pills are less soluble even than the tolu-coated.

The dragee (a French word, dragée; Latin, *tragea*, æ, f., *drageta*, æ, f., or *trachema*, atis, n., from the Greek *τράχημα*), means a sugar-coated pill. The Latin terms also mean a pastille or a coarse powder.

The granule (*granellum*, i, n., or *granulum*, i, n., diminutives of *granum*, i, n., a grain or kernel) is a very small pill for the administration of very active remedies, such as alkaloids. This is a favorite preparation with homœopaths.

The bolus (*bolus*, i, m., a choice bit, nice morsel, from *βῶλος*, a mass or lump) is a very large pill, or any rounded mass larger than a pill, but intended to be swallowed at once. Its use is almost entirely restricted to veterinary practice now. The same word in the same form is also feminine, *bolus*, i, f. which means an argillaceous earth, or bole, as *bolus alba* and *bolus rubra*, white and red bole.

The Pharmacopœia contains formulas for the following pills:

Aloes Pilulæ,	Antimonii Compositæ Pilulæ,
Aloes et Asafœtidæ Pilulæ,	Asafœtidæ Pilulæ,
Aloes et Ferri Pilulæ,	Catharticæ Compositæ Pilulæ,
Aloes et Mastiches Pilulæ,	Ferri Compositæ Pilulæ,
Aloes et Myrrhæ Pilulæ,	Ferri Iodidi Pilulæ,

Galbani Compositæ Pilulæ,	Rhei Pilulæ,
Opii Pilulæ,	Rhei Compositæ Pilulæ.
Phosphori Pilulæ,	

PLASTERS (*Emplastrum, i, n.*).

The word *emplastrum* (ἔμπλαστρον), plaster, means an adhesive, fatty, or resinous compound, which is sold either spread on muslin, leather, or other textile fabric (spread plaster, sometimes called *sparadrapus, i, m.*, *sparadrappa, æ, f.*, or *sparadrapum, i, n.*, all three forms being used), or in rolls (formerly called *magdaleon, onis, f.*, thus, *magdaleon emplastri diachyli*, roll of lead plaster).

So-called "isinglass plaster" (*emplastrum ichthyocollæ*) consisting of a solution of isinglass spread and dried on thin silk or taffeta, is also called *sericum adhæsivum (sericum, i, n., silk)*.

Fatty plasters are adhesive at the temperature of the body, but solid at ordinary temperatures. Surgeons' adhesive plaster, *emplastrum adhæsivum*, is lead plaster spread on muslin.

Formerly a number of terms were in use, such as, *emplastrum ad clavos*, corn-plaster; *emplastrum ad fracturas*, plaster for dressing of fractures; *emplastrum conglutinans*, sticking plaster; *emplastrum defensivum*, protective plaster; *emplastrum stypticum*, styptic plaster, etc.

Curiously enough the term *emplastrum diachylon*, which now means lead plaster, originally meant any plaster made from the juice (χυλόν, juice) of plants, and was applied to lead plaster because this was formerly made with the juice or mucilage of marshmallow.

The following plasters are official:

Ammoniaci Emplastrum,	Hydrargyri Emplastrum,
Ammoniaci cum Hydrargyro Em- plastrum,	Ichthyocollæ Emplastrum,
Arnicæ Emplastrum,	Opii Emplastrum,
Asafœtidæ Emplastrum,	Picis Burgundicæ Emplastrum,
Belladonnæ Emplastrum,	Picis Canadensis Emplastrum,
Capsici Emplastrum,	Picis cum Cantharide Emplastrum,
Ferri Emplastrum,	Plumbi Emplastrum,
Galbani Emplastrum,	Resinæ Emplastrum,
	Saponis Emplastrum.

POWDERS (*Pulvis, eris, m. or f.*).

While *pulvis* can be used either as a masculine or feminine word, the Pharmacopœia uses it only in the masculine gender, so that adjectives are also written in their masculine form to agree with it and we write *Pulvis compositus*, and not *composita*.

Official powders are not put up in divided doses, but are simply combinations of powders which are kept in bulk. The exception to this is the official *Pulvis effervescens compositus*. The powders should have been called *Pulveres effervescentes compositi*, as they are never given singly, but always at least two, one in a white and one in a blue paper. Besides, the use of the plural, *pulveres*, would conform with the universal practice in prescribing to call a powder put up in bulk and not in divided doses by the singular, *pulvis*, and powders in divided doses by the plural, *pulveres*, as will be explained further on. This use of the singular in the case of the official effervescing powders is an exception to this general rule which is to be regretted, and as the Pharmacopœia of 1870 used the plural instead of the singular, this might as well have been done in the present Pharmacopœia.

The following are the official powders:

Antimonialis Pulvis,	Ipecacuanhæ et Opii Pulvis,
Aromaticus Pulvis,	Jalapæ Compositus Pulvis,
Cretæ Compositus Pulvis,	Morphinæ Compositus Pulvis,
Effervescens Compositus Pulvis,	Rhei Compositus Pulvis.
Glycyrrhizæ Compositus Pulvis,	

RESINS (*Resina, æ, f.*).

The word is from the Greek *ρητινῆ*, resin. As in the case of oleo-resins, there are quite a number of natural resins in use, and also several preparations of resins made by the pharmacist. The latter are made by precipitating from concentrated alcoholic tinctures by pouring into water.

The following are the pharmacopœial resins:

Copaibæ Resina,	Resina,
Jalapæ Resina,	Scammonii Resina.
Podophylli Resina,	

SOLUTIONS (*Liquor, oris, m.*).

The official Latin title, *liquor*, means a liquid, and, therefore, if literally translated, is a title having little or no meaning. The English name, solution, is not a translation of the Latin word, but of another word, *solutio, onis, f.*, which means a liquid holding something in solution. This Latin word *solutio*, therefore, is a much more appropriate and expressive title, and should have been chosen instead of the meaningless official title; or, the English word should have been a different one, so that the name *solutio*, both Latin and English, might have been altogether used to designate a class of extemporaneous preparations commonly designated as solutions, which are essentially different from the pharmacopœial solutions.

Most of the pharmacopœial solutions are solutions of chemicals or alkaloids in water, but in two the solvent is something else, namely, diluted alcohol in solution of citrate of iron and quinine, and chloroform in solution of gutta-percha.

The following list comprises the official solutions:

Acidi Arseniosi Liquor,	Iodi Compositus Liquor,
Ammonii Acetatis Liquor,	Magnesii Citratis Liquor,
Arsenii et Hydrargyri Iodidi Liq- uor,	Pepsini Liquor,
Calcis Liquor,	Plumbi Subacetatis Liquor,
Ferri Acetatis Liquor,	Plumbi Subacetatis Dilutus Liq- uor,
Ferri Chloridi Liquor,	Potassæ Liquor,
Ferri Citratis Liquor,	Potassii Arsenitis Liquor,
Ferri et Quininæ Citratis Liquor,	Sodæ Liquor,
Ferri Nitratis Liquor,	Sodæ Chloratæ Liquor,
Ferri Subsulphatis Liquor,	Sodii Arseniatis Liquor,
Ferri Tersulphatis Liquor,	Sodii Silicatis Liquor,
Gutta-Perchæ Liquor,	Zinci Chloridi Liquor.
Hydrargyri Nitratis Liquor,	

SPIRITS (*Spiritus, us, m.*).

Spirits are solutions of volatile substances in alcohol, obtained either by distillation or by solution; volatile oils, or other volatile substances or gases, such as camphor or ammonia, are thus dissolved.

A list of the spirits of the Pharmacopœia follows:

Ætheris Spiritus,	Gaultheriæ Spiritus,
Ætheris Compositus Spiritus,	Juniperi Spiritus,
Ætheris Nitrosi Spiritus,	Juniperi Compositus Spiritus,
Ammoniæ Aromaticus Spiritus,	Lavandulæ Spiritus,
Anisi Spiritus,	Menthæ Piperitæ Spiritus,
Aurantii Spiritus,	Menthæ Viridis Spiritus,
Camphoræ Spiritus,	Myrciæ Spiritus,
Chloroformi Spiritus,	Myristicæ Spiritus,
Cinnamomi Spiritus,	Odoratus Spiritus,
Fruventi Spiritus,	Vini Gallici Spiritus.

SUPPOSITORIES (*Suppositorium, ii, n.*).

Suppositories are medicines mixed with cacao butter and formed into small cones, to be used for insertion into the rectum or vagina. When for the first, they are also called rectal suppositories and for the second, vaginal suppositories. Sometimes they are made with gelatin and glycerin.

A vaginal suppository is also sometimes called *pessum*, *i*, *n.* (*πεσσόον*), or *pessarium*, *ii*, *n.*, a vaginal suppository, a pessary.

When intended for insertion into the urethra, uterus, nasal passages, or eustachian tube, they are called bougies (*bougia*, *æ*, *f.*), from a French word meaning wax-candles.

The Pharmacopœia gives no formulæ, but only general directions for making suppositories; it also directs that "unless otherwise specified, suppositories shall be made to weigh about 15 *grains* or 1 *gram*."

SYRUPS (*Syrupus*, *i*, *m.*).

These are solutions of various kinds, containing large quantities of sugar (60 to 65 per cent).

Some syrups are medicated and present the remedies in a palatable form; others are only flavored, and are used as excipients in extemporaneous prescriptions.

The official syrups are:

Acaciæ Syrupus,	Krameriz Syrupus,
Acidi Citrici Syrupus,	Lactucarii Syrupus,
Acidi Hydriodici Syrupus,	Limonis Syrupus,
Allii Syrupus,	Picis Liquidæ Syrupus,
Althææ Syrupus,	Pruni Virginianæ Syrupus,
Amygdalæ Syrupus,	Rhei Syrupus,
Aurantii Syrupus,	Rhei Aromaticus Syrupus,
Aurantii Florum Syrupus,	Rosæ Syrupus,
Calcii Lactophosphatis Syrupus,	Rubi Syrupus,
Calcis Syrupus,	Rubi Idæi Syrupus,
Ferri Bromidi Syrupus,	Sarsaparillæ Compositus Syrupus
Ferri Iodidi Syrupus,	Scillæ Syrupus,
Ferri Quininz et Strychninæ Phos- phatum Syrupus,	Scillæ Compositus Syrupus,
Hypophosphitum Syrupus,	Senegæ Syrupus,
Hypophosphitum cum Ferro Syr- upus,	Sennæ Syrupus,
Ipecacuanhæ Syrupus,	Syrupus,
	Tolutanus Syrupus,
	Zingiberis Syrupus.

TINCTURES (*Tinctura*, *æ*, *f.*).

The word is derived from the verb *tingo* (or *tinguo*), *nxi*, *nectum*, to color, and literally means either the process of coloring, or a colored extract.

In pharmacy the word means a solution of the medicinally active constituents of drugs, or a solution of a chemical or chemicals, in an

alcoholic menstruum. The solutions of chemicals, as of iodine in alcohol, should be called solutions, rather than tinctures, limiting the latter term to weak alcoholic preparations from organic drugs.

According to the menstruum which is used, different names have been given to the preparations. Thus, a tincture made with alcohol alone, is sometimes called *alcoholatura*, *æ*, *f.*, when it is an extract from organic substances, while a solution of a chemical in alcohol was called *alcoholativum*, *i*, *n.* The first of these terms is used in the French Codex, with a slightly modified meaning. (See Tinctures of Fresh Herbs.)

A tincture containing vinegar or acids was sometimes called *acetolatura*, *æ*, *f.*, and a tincture containing ether was designated as *ætherolaturum*, *i*, *n.*, or *éthérolés* as in the French Codex.

As the most of these preparations are simply equivalent to diluted fluid extracts, it would seem that they might be profitably dispensed with altogether and the fluid extract diluted according to the requirements of each case. If it is decided to retain this class of pharmaceutical preparations in future editions of the Pharmacopœia, it would at least be advisable to give alternate formulæ for properly diluting fluid extracts to make them, as this will be in the interest of better pharmacy as well as more exact therapy.

The following is a list of the pharmacopœial tinctures, the figures expressing the percentage of the medicinal ingredients in each:

Aconiti Tinctura, 40,	Cimicifugæ Tinctura, 20,
Aloes Tinctura, 10,	Cinchonæ Tinctura, 20,
Aloes et Myrrhæ Tinctura, each 10,	Cinchonæ Composita Tinctura,
Arnicæ Florum Tinctura, 20,	Cinnamomi Tinctura, 10,
Arnicæ Radicis Tinctura, 10,	Colchici Tinctura, 15,
Asafœtidæ Tinctura, 20.	Conii Tinctura, 15,
Aurantii Amari Tinctura, 20,	Croci Tinctura, 10,
Aurantii Dulcis Tinctura, 20,	Cubebæ Tinctura, 10,
Belladonnæ Tinctura, 15,	Digitalis Tinctura, 15,
Benzoini Tinctura, 20,	Ferri Acetatis Tinctura,
Benzoini Composita Tinctura,	Ferri Chloridi Tinctura,
Bryoniæ Tinctura, 10,	Gallæ Tinctura, 20,
Calendulæ Tinctura, 20,	Gelsemii Tinctura, 15,
Calumbæ Tinctura, 10,	Gentianæ Composita Tinctura,
Cannabis Indicæ Tinctura, 20,	Guaiaci Tinctura, 20,
Cantharidis Tinctura, 5,	Guaiaci Ammoniatæ Tinctura, 20,
Capsici Tinctura, 5,	Humuli Tinctura, 20,
Cardamomi Tinctura, 15,	Hydrastis Tinctura, 20,
Cardamomi Composita Tinctura,	Hyoseyami Tinctura, 15,
Catechu Composita Tinctura,	Ignatiæ Tinctura, 10,
Chiratæ Tinctura, 10,	Iodi Tinctura, 8,

Ipecacuanhæ et Opii Tinctura, each 10,	Quassia Tinctura, 10,
Kino Tinctura, 10,	Rhei Tinctura, 12.
Krameria Tinctura, 20,	Rhei Aromatica Tinctura, 20,
Lavandulæ Composita Tinctura,	Rhei Dulcis Tinctura, 8,
Lobelia Tinctura, 20,	Sanguinarie Tinctura, 15.
Matico Tinctura, 10,	Saponis Viridis Tinctura, 65,
Moschi Tinctura, 10,	Scilla Tinctura, 15,
Myrrhæ Tinctura, 20,	Serpentaria Tinctura, 10,
Nucis Vomica Tinctura, 20,	Stramonii Tinctura, 10,
Opii Tinctura, 10,	Sumbul Tinctura, 10,
Opii Camphorata Tinctura, each 0·4.	Tolutana Tinctura, 10,
Opii Deodorata Tinctura, 10.	Valeriana Tinctura, 20,
Physostigmatis Tinctura, 10,	Valeriana Ammoniata Tinctura, 20
Pyrethri Tinctura, 20,	Vanilla Tinctura, 10,
	Veratri Viridis Tinctura, 50,
	Zingiberis Tinctura, 20,

TINCTURES OF FRESH HERBS (*Tincturæ Herbarum Recentium*).

The Pharmacopœia only gives general directions for making these :

Take of

The fresh herb, bruised or crushed.....	50 parts.
Alcohol.....	100 parts.

Macerate the herb with the alcohol for fourteen days; then express the liquid and filter.

In the French Codex these tinctures are designated as *alcoolatures* (*alcoholatura*, æ, f.).

TRITURATIONS (*Trituratio*, *onis*, f., or *tritura*, æ, f.).

The term is derived from the verb *tero*, *trivi*, *tritum*, to rub fine. This class of preparations is new in the Pharmacopœia.

The Pharmacopœia gives a general formula as follows:

Take of

The substance	10 parts.
Sugar of milk, in moderately fine powder.....	90 parts.

To make.....100 parts.

These substances are to be thoroughly mixed into a very fine powder.

The Pharmacopœia contains only one trituration: *Elaterini Trituratio*.

TROCHES (*Trochiscus*, *i*, m.).

The term *trochiscus* (*τροχιβάκος*), troche or lozenge, is applied to a small flattened cake, made from sugar and gum or other adhesive

substance, with which medicinal ingredients have been incorporated. These are worked into a mass and rolled out flat, and from this the troches are punched with dies of oval, round, octagonal or other forms; or troches may be made by compression. Troches are used mainly for local effects on the mucous membranes of the mouth and pharynx, by allowing them to dissolve slowly in the mouth.

The word *tabula*, *æ*, f., or the diminutive *tabella*, *æ*, f., a small plate, a tablet, is sometimes used to designate the same kind of preparation.

Another term, *pastilla*, *æ*, f., a pastil (diminutive of *pasta*, *æ*, f., dough or paste), is a term applied to a class of preparations mainly used for fumigation. The fumigating pastilles (*pastillæ fumales*), are small conical bodies, which, when ignited, are slowly consumed, emitting perfumed odors as they burn. They may also be used as moxas (*moxa*, *æ*, f.), by burning on the skin.

The word *rotula*, *æ*, f. (diminutive of *rota*, *æ*, f., a wheel), designates a small disc of sugar which is impregnated with alcoholic solutions of ethereal oils, as in the well-known "peppermint drops." *Rotulæ sacchari* are the little sugar tablets before the flavoring spirit has been added.

The disc (*discus*, *i*, m., from the Greek *δίσκος*, a plate, a disc) is a small circular troche of gelatin, with which medicinal agents are incorporated.

They are made to dissolve in water for subcutaneous injection, or occasionally for use by oculists to apply atropine or other remedies to the eye.

The following troches are official:

Acidi Tannici Trochisci,	Magnesiae Trochisci,
Ammonii Chloridi Trochisci,	Menthæ Piperitæ Trochisci,
Catechu Trochisci,	Morphinæ et Ipecacuanhæ Troch-
Cretæ Trochisci,	isci,
Cubebæ Trochisci,	Potassii Chloratis Trochisci,
Ferri Trochisci,	Sodii Bicarbonatis Trochisci,
Glycyrrhizæ et Opii Trochisci,	Sodii Santoninatis Trochisci,
Ipecacuanhæ Trochisci,	Zingiberis Trochisci.
Krameriae Trochisci,	

VINEGARS (*Acetum*, *i*, n.).

Vinegars are made by extracting the active constituents of drugs with wine vinegar, or with diluted acetic acid. They are not a very elegant class of preparations, and, with the exception of vinegar of squill, are not very often used.

The menstruum or fluid used to make vinegars was formerly called

acetototivum, i, n., an acidulated fluid. An infusion made with such a menstruum, instead of water, was an *acetolatum, i, n.*; or a tincture containing vinegar was an *acetolatura, æ, f.*; a mixture of a medicated vinegar with honey was called *oxymel* or *acetomel* [see Honeys], and foods made with vinegar, such as salads or pickles, were *acetaria, orum, n.*; *acetositas, atis, f.*, the sour, that which is sour, was a term occasionally employed, as, for instance, *acetositas citri*, lemon juice, literally, the sour of lemons.

Only four vinegars are pharmacopœial:

Lobeliæ Acetum,	Sanguinariæ Acetum,
Opil Acetum,	Scillæ Acetum.

WATERS (*Aqua, æ, f.*).

This class of preparations is often spoken of in the dispensatories as "Medicated Waters" (*Aquæ medicatæ*), although that is not the pharmacopœial title. Waters which have been made aromatic with volatile oils, are also called "Aromatic Waters" (*Aquæ aromaticæ*). These latter are simply used as diluents in extemporaneous prescriptions.

The plural of *aqua*, or *aquæ, arum, f.*, formerly meant mineral waters, or watering-places. In this sense, Saratoga or Hot Springs were "aquæ." We now speak of mineral waters as *aquæ minerales*, and of waters charged with carbonic acid as *aquæ aëratæ*. Artificial mineral aërated waters are much used, and are dispensed in syphons. In the prescriptions they are commonly designated by their vernacular names, and not by Latin titles. Well-made artificial mineral waters are to be preferred to the natural waters, except when the latter are drunk fresh at the springs.

In the Pharmacopœia we find the following:

Ammoniæ Aqua.	Cinnamomi Aqua,
Ammoniæ Fortior Aqua,	Creasoti Aqua,
Amygdalæ Amaræ Aqua,	Destillata Aqua,
Anisi Aqua,	Fœniculi Aqua,
Aqua,	Menthæ Piperitæ Aqua,
Aurantii Florum Aqua,	Menthæ Viridis Aqua,
Camphoræ Aqua,	Rosæ Aqua.
Chlori Aqua,	

WINES (*Vinum, i, n.*).

Natural wines are frequently prescribed by physicians. There is, however, also a class of pharmaceutical preparations, consisting of tinctures, in which wine is used as a menstruum, and these preparations are called "medicated wines" in the dispensatories, while the

Pharmacopœia simply calls them "wines." Medicated wines have about the same pharmaceutical and therapeutical value as the corresponding tinctures.

There are a number of very valuable "elegant" pharmaceutical preparations, such as "Beef, Wine, and Iron," "Beef, Wine, and Iron with Cinchona," etc., which combine tonic and stimulant properties with an exceedingly pleasant taste.

The following are the pharmacopœial medicated wines:

Aloes Vinum,	Ferri Amarum Vinum,
Antimonii Vinum,	Ferri Citratis Vinum,
Aromaticum Vinum,	Ipecacuanhæ Vinum,
Colchici Radicis Vinum,	Opii Vinum,
Colchici Seminis Vinum,	Rhei Vinum.
Ergotæ Vinum.	

OFFICIAL PREPARATIONS.

As already explained, these are unofficial formulæ which, however, are contained in books generally to be found in drug stores. There are a number of classes of preparations which are commonly used but which are not official, and which we have not had occasion to describe already.

JUICES (*Succus, i, m.*).

This class of preparations is made by forcibly expressing the juice of the fresh drugs, as of belladonna leaves, and then mixing with a certain proportion of alcohol to preserve them. They are a comparatively worthless class of pharmaceutical preparations which did not deserve to be official.

The expressed juice of a fresh drug was formerly called *enchylisma, atis, n.* (*χυλός*, juice), and when such a juice was inspissated or evaporated to syrupy consistence, it was called "succus inspissatus," or "roob," as *roob juniperi*. The word roob is from the Arabic, and is either *roob, is, n.*, or *roob, n.*, indeclinable.

LIQUID EXTRACTS (*Extracta Liquida*).

A class of preparations made like fluid extracts, but other strength. Such are the 50 per cent solutions of aloes, catechu, etc., commonly sold in the trade under the name of "fluid extracts" of the corresponding drugs. It is, of course, impossible to make a true fluid extract of these substances, as it is impossible to have the soluble part of 1 gram of drug contained in 1 cubic centimeter of the finished fluid.

“SPECIES” (*Species, ierum, f. pl.*).

The plural of the word *species, ei, f.*, is used in pharmacy to designate a mixture of coarse vegetable powders, used for teas, or to macerate in liquors to make “bitters,” as in the case of the well-known *species ad longam vitam*, or the equally well-known *species pectorales* or “pectoral teas.”

Species are commonly used to make teas, but are more frequently called for by the laity than prescribed by physicians. Mixed with hot water, some species are used to make poultices, also called cataplasms (*cataplasma, atis, n., κατάπλασμα*, or also formerly *chliasma, atis, n., χλίσμα*). A dry poultice, consisting of a species sewed in a small bag and applied warm, as the popular sack of bran for toothache, was called *saccellatio, onis, f.* Formerly, and perhaps now, small bags with camphor were worn over the chest, suspended by a ribbon about the neck, to keep off cholera or other infectious diseases; more recently “liver pads,” and innumerable other patent “pads,” were also much used; such a sac, with its contents, was called *sacculus, i, m.*, or when it was larger and used as a pillow it was called *cataclitum, i, n. (κατακλιτον)*, as, *cataclitum humuli*, hop pillow. Some of the modern pillows advertised as catarrh remedies, might be also classed here.

When these sacs, with their contents, were used as amulets for superstitious reasons, as when the negroes of to-day buy and carry about themselves “female” loadstones to attract the females, while the negresses carry “male” loadstones to attract the males, then they were called *bambaceutria, orum, n. (βαμβακεύτρια)*, meaning fetishes, charms, spells, or witch-remedies. The “love-powders,” often called for even in this enlightened age, would also be *bambaceutria*. The same word also means poison, and the art of mixing these remedies was called *bambacia, æ, f. (βαμβακεία)*, the mixing of poisons—Gift-mischerei, G.). To counteract these spells, other remedies were worn about the body, generally in small sacs suspended about the neck; such a remedy against witchcraft was called *basanium, ii, n. (βάσκανιον)*.

These various remedies constituted a considerable part of the stock of the apothecary in the days of Shakespeare, if we may judge from the description in *Romeo and Juliet*, but it is not unusual that demands for them are made on the druggist of to-day. It is surprising to what extent similar remedies are worn even at the present time. The potato or buckeye worn in the pocket to ward off Bright’s disease or rheumatism; or the loadstones; or many of the galvanic belts, scrotal supporters, soles, etc.; the clover leaf for good-luck; or the amulets from Lourdes; the little sacs with pictures of saints pasted

on them, hung around children's necks to prevent diphtheria, or around the necks of thousands of apparently intelligent people to ward off evils of all kinds, all belong to the same category of *bambacutria*, but the sale has been transferred from the apothecary shops of "ye olden time" to the bookstores of the present; nor is it the *medical* profession which prescribes them at the present time.

When species are ordered for the purpose of making an infusion from them, into which flannels or cloths are to be dipped while it is still hot, and then applied to the body, or parts of the body, such a remedy is called a fomentation, or, in Latin, *fotus, us, m., fomentatio, onis, f.,* or *fomentum, i, n.* A flannel wrung out of hot chamomile tea, over which turpentine is sprinkled, would be a remedy of this kind.

MANY OTHER PREPARATIONS,

such as baths, enemias, gargles, potions, injections, etc., are sometimes officinal, but are more usually prescribed extemporaneously, and will be considered when we reach the subject of extemporaneous prescriptions.

PATENT AND PROPRIETARY PREPARATIONS.

By these titles preparations are designated which are made according to formulæ originated by individuals or firms who hold a copyright on the name or a patent on the composition of the remedy, which latter they keep secret. Some of these preparations are put on the market by advertising them directly to the consuming public through the daily papers or by the distribution of almanacs, and these medicines are called "patent medicines." The manufacture and sale of patent medicines has assumed immense proportions, mainly on account of the moral support which it has received from the members of the pharmaceutical profession, by allowing their names and addresses to be printed on the covers of the almanacs and circulars, and then distributing them to their customers. This is generally looked upon by the public as an indorsement of the statements of the almanac by the druggist, and it is probable that without such presumed indorsement many now popular remedies would not have achieved any success. Many patent medicines, of course, are worthless, but some possess considerable merit, and serve a valuable purpose in sparsely settled districts where it is impossible to obtain proper medical attendance.

Another class of preparations has recently become popular with many druggists as a substitute for patent medicines. They differ from patent medicines only in having either a real or pretended state-

ment of the composition of the contents printed on the label, and the name of the retail druggist on the wrapper instead of on the cover of the almanac. By closely imitating the style of putting up, and even the names of well-known and well-advertised patent medicines, these so-called "non-secret" remedies have come into extensive use and offer better profits than the corresponding patent medicines.

It is not our object to discuss the ethical questions which are involved in the sale of either the "patent" or "non-secret" medicines, but we leave this for each one to settle in his own mind.

A number of very valuable remedies have recently been introduced into general use, and are extensively prescribed by physicians, which are only made by one manufacturer, because he holds a patent on the process of production. It seems but right that when anyone has devoted much time, study, and money to the discovery and elaboration of a valuable process of making a meritorious article, that he should be protected by letters patent in the utilization of his process. In this case no one is prevented from making the same remedy by another, essentially different process, if he can. Such a remedy, though only obtainable from the patentee of the process, is not in any sense a patent medicine, and should not be so considered.

The copyrighting of the name of a preparation does not patent the process nor the combination of remedies, but leaves it free to every one to make a similar preparation, but prevents him from using a similar name. As the demand for many of these preparations is exclusively due to advertising, and as they have a sale only under certain names, it is clear that this secures the benefits of advertising to the one who pays for it. Many of these preparations are intended to be prescribed by physicians, and are not advertised to the general public. It is a legitimate business enterprise to make such preparations, for no one is compelled to use them unless he chooses to do so, and if a physician desires to prescribe them, he can well enough afford to let the profits go to the one who originated the article; nor would it be honest for the dispensing pharmacist to put up something else without the knowledge or consent of the prescriber.

There is still another class of preparations, sometimes called proprietary, the formulæ for which are common property, such as various elegant pharmaceutical preparations, elixirs, wines, syrups, etc., but different firms either claim to possess, or really do possess, better facilities or greater knowledge and skill in making them, so that the products, though similar in name, are really different in regard to medicinal worth. This applies, also, to regular pharmacopœial preparations, such as fluid extracts and chemicals, and it is in regard to these preparations that the propriety or impropriety of specifying in prescriptions is most hotly contested.

“SPECIFYING” IN PRESCRIPTIONS.

On this subject the author of these pages submitted a paper to the American Pharmaceutical Association at its meeting, in Milwaukee, Wis., August, 1884, which was printed in its proceedings, and from which we reprint the following:

The question, to what extent a physician is justified in specifying certain preparations in his prescriptions, is one to which widely different answers are apt to be given, according to the pecuniary and business interests involved. Many pharmacists take the ground that it is unprofessional for the physician ever to specify a certain manufacturer's pills, fluid extracts, elixirs, etc., while others freely acknowledge his right to do so.

This question is one which can best be answered by looking at it from the physician's standpoint, for if it is to his own and his patient's interest that he should specify, then it is proper for him to do so. The physician's duty to his patient is not comprised merely in the visit, the diagnosis, and the written prescription, but it includes also the responsibility for the proper execution of his orders. The physician owes it to his patient to see that he is placed under the best possible conditions for an early restoration to health, to provide proper hygienic surroundings, to regulate his baths, his diet, and nursing, and last, not least, to see that the proper medicines are administered at the necessary time.

In other words, the physician must regulate and control every influence that may restore his patient to health, and the neglecting or slighting of any of these things is a sin of omission towards his patient, who looks to him for his chance of recovery. Not only is it necessary to do all this for the patient's sake, but it is for the physician's own good that he should attend to all these matters. Success in any pursuit in life depends upon an attention to details, and the physician who pays attention to all the details, that may or may not assist in rescuing his patient from threatened death, is more successful than he who contents himself with merely writing a prescription and giving a few general directions, which, from the careless manner in which they are frequently given, do not impress themselves upon the attendant's mind as important, and are neglected to the imminent peril of the patient.

One of the details often overlooked by the physicians, to their own and their patients' lasting injury, is the looking after the character of the medicines dispensed on their prescriptions.

Many pharmacists speak and write as if they think that it must be taken for granted that every pharmacist is honest, and in all regards—ability, education, and business tact—equal to every other pharma-

cist. But is there anything in the profession of pharmacy that compels us to believe this? Do the gentlemen claiming this believe it themselves?

Can they not always point out to the physician reasons why he should use their own prescription blanks, and send his patients to them for their medicines? The fact is, the business of pharmacy is like any other business or calling in life. Pharmacy is followed by able, mediocre, and incompetent men—by honest, indifferent, and dishonest men.

Mankind is the same all the world over, and when there are retail pharmacists who are indifferent to the quality of goods they dispense, and consider only the price of the goods in determining which they will buy, there will also be manufacturers who will make cheap preparations, and wholesalers who will supply them. The trade adapts itself to the requirements, and the demand regulates the supply.

Every pharmacist knows that preparations are often offered in the market for less than the ingredients of an honestly made preparation would cost. If he buys this preparation, is he not guilty of encouraging and abetting dishonesty? Does the plea that he does not know the character of the preparation, but supposes it to be all right as long as he hears no complaint, exonerate him from the charge that he is willfully jeopardizing human life and health for the sake of pecuniary profit? Is he any more honest than one who would substitute cinchonine for quinine, or would only give half weight or measure of important medicines?

Does not the fact that price lists quote "commercial red cinchona" at 14 cents a pound prove that such stuff exists and is consumed as red cinchona? And is it not likely that "cheap" goods are made from cheap materials?

Every one knows that there are honest and dishonest pharmacists, honest and dishonest manufacturers, and honest and dishonest goods in the market, and the latter kind is by no means rare. Could we believe that every pharmacist was honest and competent, and that all medicines were equally efficient, there would be no necessity for the physician to specify.

When we have a valuable watch that needs repairs, we do not take it for granted that every one who has a sign before his door announcing himself to be a watchmaker is, therefore, to be trusted with our watch, but we will pass a dozen watchmakers and go a long distance to take our watch to one we know to be a competent workman. If, then, we are so particular about our watch, why should we not be equally particular about our much more valuable selves? When we choose a physician, we try to do so intelligently. We have, or think we have, reasons why we prefer our physician to the great num-

ber of other physicians around us. Why should we act differently in regard to the pharmacist, and prefer the one who happens to live nearest to us merely on account of this fact? Should we not rather, as patients, prefer to send our prescriptions to one whom we know to be competent and honest, rather than to those who may be equally honest and able, but about whom we know nothing—or, as the patient frequently can not judge, is it not best to trust our physician to choose for us, when his interests and ours are so intimately interwoven, for our health and the physician's reputation alike depend upon the quality of the medicine dispensed? Nay, even more, is it not to the honest and competent pharmacist's interest that business probity, and integrity, and professional ability should be recognized and appreciated? It is plainly the duty of the physician to advise the patient how and where to obtain the best medicines, and he does so generally by using the prescription blank of the pharmacist whom he prefers. His use of such a blank is clearly a specification of the preparations of that particular pharmacist, and an indorsement of them. It does not seem to occur to those who argue against the physician's right to designate a certain manufacturer's preparations that he is equally wrong and unprofessional when he uses their blanks. If one is wrong, the other must be the same. In one case, it is an indorsement of a wholesale manufacturer, in the other case of a retail manufacturer, with the advantage in specifying the wholesale manufacturer's goods that he can obtain them everywhere and anywhere, while the others are obtainable only in one drug store.

We must admit that there is a difference, and often a great difference, between the various preparations sold under the same name; that some are almost worthless, others very active. No matter if we try to argue that ours is just as good; the physician is entitled to get what he prescribes.

The retail pharmacist may convince the physicians in his neighborhood that he has the best and purest medicines, in which case the physicians will no doubt allow him to use his own preparations. We have known of physicians who specified certain preparations, but have given permission to individual druggists to use their own preparations when the prescriptions were taken to their drug stores. There is no objection to this; it is rarely the case that the physician specifies except in the case of the more important remedies, or when he is not sure to which drug store his prescription will be taken. In regard to the majority of ingredients, he leaves the choice to the pharmacist's judgment. When he does specify, his wishes should be respected and complied with as far as possible.

To conclude, then, it is the writer's belief, based upon many years' experience, that the physician is derelict in a part of his duty if he

does not see to it that his patient obtains proper medicines, and he is equally unmindful of his own best interests.

He should, therefore, specify to the extent that he may know that proper remedies are dispensed, either by directing the patient to go to a certain drug store, or by specifying a particular preparation with which he is familiar, and in which he has confidence, and it is certainly wrong for him to show less interest in so important a matter as medicines, than he shows in regard to his wearing apparel, his food, or fuel, or any other commodity in regard to which he exercises an intelligent choice.

FORM OF FORMULÆ.

The manner of writing permanent prescriptions does not vary much in different works, or even in different countries. Generally the names of the ingredients are written in one column, and the quantities in another column to the right.

The oldest pharmacopœia of which we have any knowledge is a large and very well preserved papyrus found about 1858 in the Necropolis at Thebes. This papyrus is supposed to be one of the six works on medicine ascribed to the God Hermes (Egyptian Thoti), and was probably compiled and written at the great university at Thebes, about 1550 B. C., or at a time previous to the exodus of the Israelites from Egypt, or when Moses was still a young man. In this work the arrangement of the formulæ, including such for decoctions, confections, pills, etc., are written according to the plan mentioned above, as will appear from the following translation of one of the formulæ from the ancient hieroglyphics:

FOR SICK INTESTINES.

Fennel seed.....	1/64	drachma.
Goose fat.....	1/8	drachma.
Milk.....	1	tenat.
Boiling, stirring and eating.		

In these most ancient formulæ, no introduction was used, but the writer, or writers, proceeded at once to the enumeration of the medicines, in this respect resembling the usage in the United States Pharmacopœia. As in this latter work, the directions for compounding and for using the medicines also follow after the formula itself.

In modern works, this same plan of one column for ingredients and one for quantities is generally adopted, because such an arrangement allows the reader to have a better oversight over the whole prescription, and, therefore, aids in avoiding mistakes in compounding.

We copy the following from the Pharmacopœia:

PILULÆ FERRI IODIDI (PILLS OF IODIDE OF IRON).

	Grains.	Grammes.
Reduced Iron, <i>sixty grains</i>	60	4.00
Iodine, <i>eighty grains</i>	80	5.20
Glycyrrhiza, in No. 60 powder, <i>fifty grains</i>	50	3.25
Sugar, in fine powder, <i>fifty grains</i>	50	3.25
Extract of Glycyrrhiza, in fine powder, <i>twelve grains</i>	12	0.75
Acacia, in fine powder, <i>twelve grains</i>	12	0.75
Water,		
Balsam of Tolu,		
Stronger Ether, each, <i>a sufficient quantity</i> .		
	264	17.20

To make *one hundred pills*.... 100

“To the Reduced Iron, contained in a porcelain capsule, add about *one hundred and twenty (120) grains*, or about *eight (8) grammes* of Water, and gradually add the Iodine, constantly triturating until the mixture ceases to have a reddish tint. Then add the remaining powders, previously mixed, and evaporate the excess of moisture on the water-bath, constantly stirring, until the mass has acquired a pilular consistence. Lastly, divide it into *one hundred (100) pills*.

“Dissolve *one (1) part* of Balsam of Tolu in *one (1) part* of Stronger Ether, shake the pills with a sufficient quantity of this solution until they are uniformly coated, and put them on a plate to dry, occasionally stirring them until the drying is completed.

“Keep the pills in a well-stopped bottle.”

In this formula we see an example of an unusually fully and carefully constructed formula. Not only are the names of the ingredients made prominent by a heavier type and capitalization, and the quantities expressed in both the ordinary apothecaries' weight and metric weights, but quantities are also printed in italicized words, so that a mistake in compounding can only be due to carelessness.

Ordinarily such a formula would be written somewhat differently, and would commence with an imperative “take” or “take of,” so that this formula would, perhaps, read as follows:

Take of	
Reduced iron	60 grs.
Iodine	80 grs.
Glycyrrhiza, powdered	50 grs.
Sugar, powdered.....	50 grs.
Extract of glycyrrhiza, powdered.....	12 grs.
Acacia, powdered	12 grs.
Water	q. s.

Mix. Divide into 100 pills; coat with tolu balsam.

Instead of giving full directions for making the pills it is here taken for granted that the pharmacist possesses enough knowledge to make the pills without them. The full directions for making the pills might, however, be given just as well with this formula as with any other.

Still another method of writing the formula would be to intersperse directions with the ingredients.

Take of	
Reduced iron.....	60 grs.
Place into a porcelain capsule and add	
Water	2 fl.dr.
Add gradually with constant stirring	
Iodine	80 grs.
Mix together	
Powdered glycyrrhiza.....	50 grs.
Powdered sugar.....	50 grs.
Powdered extract of glycyrrhiza.....	12 grs.
Powdered acacia.....	12 grs.

Add to the contents of the capsule. Mix thoroughly and evaporate to pillular consistence. Divide into 100 pills. Coat with tolu balsam.

This formula is easily followed and compounded, and, therefore, this is a very good method of writing working formulæ.

Probably the least desirable method is to write the formula in the form of solid matter straight across the lines, as in the following example:

“Take 60 grains of reduced iron and place it into a porcelain capsule with 2 fluidrams of water. Add 80 grains of iodine, stirring constantly until the mixture assumes a reddish tint. Mix separately 50 grains each of powdered glycyrrhiza and of powdered sugar, and 12 grains each of powdered extract of glycyrrhiza and of powdered acacia, and add the powders to the contents of the capsule. Mix all together thoroughly and evaporate to a pillular consistency, and then divide into 100 pills. Coat the pills with tolu balsam.”

Of these different methods of writing formulæ the best one for general use is an enumeration of all of the ingredients and quantities in two parallel columns, and then the directions for compounding, unless the latter is so simple that no directions are needed.

Whenever practicable, the best plan of constructing a formula is to use “parts by weight,” as in the United States Pharmacopœia, instead of giving actual weights or measures, but of the many and great advantages of this method we will speak further on in the proper place.

PART II.

WEIGHTS AND MEASURES.

SYSTEM OF NUMERATION.

When primitive men had advanced so far in civilization that exactness in all their dealings became desirable, then some system of counting and expressing quantities of weight, measure, length, and time became necessary.

The simplest division of time, which is noticeable even to the lower animals, is that into day and night. This must, of course, have been impressed on the minds of our earliest human ancestors, or perhaps have been already a conscious reality to the higher apes before they commenced to develop a language and to emerge into humanity. The division into lunar months required a higher development of intellect and the division of the day into hours and minutes, or the establishment of years and calendar months, based upon the seasons together with astronomical observations, necessarily implied a much more developed civilization, and could not have taken place until the evolution of mankind had made considerable headway.

In order, however, to count the hours, the months, and years, or even long previous to that, to count the members of their families, the number of their flocks, or of any of their belongings, a system of numeration was required by men, and it was but natural that the individual would keep tally on his fingers as he counted. Wherever we find men, no matter how low they may be in the scale of intellectual development, if they can count at all they count in multiples of five, the number of fingers of one hand. Beyond this they may vary in their system of counting; sometimes counting the fingers of both hands, and then commencing over again, or they may also count their toes. Many of the savage nations are said to have no words in their language for numbers over ten, and can form no ideas or conceptions of numbers beyond the number of their fingers, all over ten being "many."

As an example of primitive numeration we may quote the system of counting used by the Guinea Indians. These Indians have words for only four numbers, corresponding to four fingers, and as they come to

the fifth they say "one hand," instead of "five fingers." Six is "a hand and a finger," seven, "a hand and two fingers;" when they reach the tenth finger they say "two hands;" then they count along the toes until they reach fifteen or "three hands," and when they come to twenty they pass to the next column, as it were, and say, not "four hands," but "one man." After this they proceed by a system of twenties, "two men," "three men," etc.; forty-six being "two men, a hand, and a finger."

The habit of counting in multiples of five, therefore, was ingrafted into the human mind by the Omnipotent when He created man by development from five-fingered apes.

The individual human being undergoes, in his embryonic and foetal conditions, all the steps of the evolution by which his race became developed in the course of ages from the lower organisms to the shape of the man-like apes, and, finally, to that of man himself, so that his developing body in turn resembles the embryo of fish, reptile, bird, quadruped, and ape, but does not stop at any of these stages, but progresses to the form of man. So also the intellect of the individual human being, although born with different capacity for development, yet goes through all the stages of mental progress, which has characterized the advancement of his race up to his own position in the race, from the speechless ape to the scientist and philosopher of to-day. Infants, therefore, whether born in the hut of the Hottentot or Papuan, or in the domicile of the most intellectual parents, learn instinctively to count on their fingers in multiples of five, and will presumably do so to the end of time.

We may take it for granted that this habit of counting in multiples of five is so firmly ingrained into the human mind that nothing will ever eradicate it. It is, therefore, somewhat Don Quixotic when here and there some have speculated about the introduction of an arbitrary system of numeration based on multiples of eight, called an "octonary system." Such a system was proposed in the last century, by Swedenborg, the religious visionist and founder of a new religious sect, and has lately been referred to again by a well-known writer* on pharmaceutical subjects, and the reason stated for this desire to revolutionize our methods of numerical notation is the insignificant fact that ten can not be successively divided by two until brought down to the number one. To say that this fact makes ten an inconvenient periodical number for arithmetical notation, is simply an assertion based on no foundation of facts, and without any advantage to be gained by a change. Moreover, it would be almost, if not entirely, impossible to learn to *think* in an octonary system, for if we watch

*See "A Manual of Weights, Measures, and Specific Gravity," by Professor Oscar Oldberg, page 14.

ourselves carefully we find ourselves continually using the fingers of our hands as aids in our calculations, not only when we were school children, worrying over our lessons in addition, but even when we are grown up. In fact, an octonary system of numerical notation would have been possible only if mankind had ascended or developed through the *ateles*, or four-fingered apes, and became impossible when the first primitive man realized that he was created with five fingers on each hand.

Civilized man soon reduced numeration to a definite system, and the decimal notation, based on the number of fingers, was at an early date of the history of mankind in universal use. Our methods of counting and all of our arithmetical calculations are, therefore, decimal. It would be desirable that our systems of money and of weights and measures should be in accord with our methods of counting and calculating, and we Americans, who boast of being a practical nation, at an early date of our national existence adopted the dollar with its subdivision into dimes, cents, and mills, instead of the pounds, shillings, and pence of our mother country. The English language will probably soon be the universal language of commerce, and the dollar the universally adopted international coin, and all we need now is to bring our systems of weights and of measures of length and capacity into accord with our money system, and with the weights, and measures of the balance of the nations of earth, so that we may have one universal language, and one system of money, of weights, and of measures. *To meet with cosmopolitan indorsement and adoption, such systems must be decimal.* This is the one essential requirement. If the systems of weights and measures stand in some simple relation to each other, so much the better; and if the unit from which all are calculated is some geographical magnitude, so that the standard could be reproduced if it was ever lost, this would be still better. The only system of weights and measures now known which stands any chance whatever of becoming international and cosmopolitan is the decimal or metric system. When we have an international system of weights and measures, with or without an international language, a cosmopolitan or international pharmacopœia becomes a possibility and will no doubt soon be a reality.

OLDBERG'S PROPOSED SYSTEM OF WEIGHTS AND MEASURES

Quite recently Professor Oscar Oldberg* has proposed a new system of apothecaries' weights, which it may be worth while to consider in connection with this subject of binary subdivision, since the entire

*Weights, Measures, and Specific Gravity, 1885.

system is proposed for the purpose of securing the supposed advantages of this consecutive division by 2.

The system proposed is as follows:

Weight.

1 troy ounce	=	8 drams.
1 apothecaries' dram	=	4 grams.
1 gram	=	16 (new) grains.

One (new) grain, therefore, is equal to $\frac{1}{16}$ gram.

Measure.

1 fluidounce	=	8 fluidrams.
1 fluidram	=	4 fluigrams.
1 fluigram	=	16 (new) minims.

One (new) minim, therefore, is equal to $\frac{1}{16}$ fluigram.

In favor of this system Professor Oldberg says:

“It will be seen that the above plan involves also a change from 60 to 64 in the number of grains to the dram. Such a change would be of great advantage, as 60 can not be divided successively by 2 without fractions, more than twice, whereas 64 can be divided into halves, quarters, eighths, sixteenths, thirty-seconds, and sixty-fourths.

To judge of this alleged desirability, the writer took a popular work on therapeutics and ascertained the proportions of the fractions of grains and drams used in giving the doses, and found that of binary fractions $\frac{1}{2}$ was used nineteen times, and $\frac{1}{4}$ three times, and the other fractions, such as $\frac{1}{8}$, $\frac{1}{16}$, $\frac{1}{32}$, $\frac{1}{64}$, not at all, while in the same pages which contained the above fractions, other fractions, such as $\frac{1}{5}$, $\frac{1}{6}$, $\frac{1}{10}$, $\frac{1}{12}$, $\frac{1}{15}$, $\frac{1}{20}$, $\frac{1}{30}$, $\frac{1}{50}$, $\frac{1}{60}$, $\frac{1}{100}$, etc., were used altogether 106 times, or nearly five times as often.

Taking up a list of formulæ of pills, in which, if anywhere, binary fractions would be convenient, it was found that on ten pages taken at random $\frac{1}{2}$ was used thirty-two times, $\frac{1}{4}$ nine times, $\frac{1}{8}$ fourteen times, $\frac{1}{16}$ once, and lower binary fractions not at all, while in the same pages other fractions, $\frac{1}{3}$, $\frac{1}{6}$, $\frac{1}{10}$, $\frac{1}{20}$, etc., were used altogether fifty-one times. Since these binary subdivisions are more desirable in formulæ for pills than elsewhere, on account of the manner of subdividing the mass, this would seem to show that the desirability of this new system is imaginary, and not based on any actual wants of the professions concerned. On the contrary, the frequency of occurrence of such fractions as $\frac{1}{5}$, $\frac{1}{10}$, $\frac{1}{20}$, $\frac{1}{50}$, $\frac{1}{100}$, etc., shows that there is the unconscious desire to use decimals in preference to other fractions, and this becomes even clearer when we take into consideration only the binary fractions below $\frac{1}{2}$, for then we find that they were used only twenty-four times, while other fractions below $\frac{1}{2}$, which were not obtained by successive subdivision by two, were used 157 times. In this enumeration no count was made of whole grains to

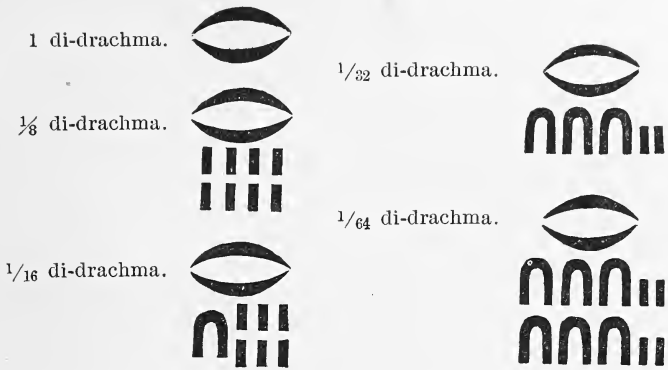
ascertain what fraction of the dram they represented, but if this had been done the argument would be very much stronger against the proposed new system.

The claim, then, that the practice of the professions demands a system capable of binary subdivisions, is based on an erroneous impression on the part of the proposer of this new system. And, indeed, we could hardly expect anything different if we consider the development of a knowledge of numbers and their relations in the human mind. The most advanced pedagogues of modern times teach us that children should be made thoroughly familiar with the number one before proceeding to other numbers. When the child is thoroughly drilled in all the relations of this number, and all the changes and combinations of 1 , $1 + 1 = 2$, $1 \times 1 = 1$, $1 - 1 = 0$, $1 \div 1 = 1$, etc., it is then taught that $2 + 1 = 3$, $2 + 2 = 4$, $2 \times 1 = 2$, $2 \times 2 = 4$, etc., until it is familiar with all the relations of the number two, together with the lower number already learned. To be able to use higher numbers requires a higher grade of intelligence and longer education, and 3, 4, 5, 6, 7, 8, 9, and 10 are successively considered until the child, step by step, widens its range of thought and ability to use figures. Beyond ten we have essentially a repetition of the multiples of former numbers, and an amplification of the principles already taught. It is, therefore, but natural that children or others with limited education should prefer calculations involving mainly the number two, but it is an adaptation of ourselves to lower intellectual development when we propose to conform not only our system of numeration, but also our systems of weights and measures to the capacities of the less educated, instead of bringing the masses up to a level in which the decimal system is used and preferred.

It is interesting to observe in this connection that the proposition to divide the dram into eighths, sixteenths, thirty-seconds, etc., is not original with Professor Oldberg, but that it was formerly used and then discarded.

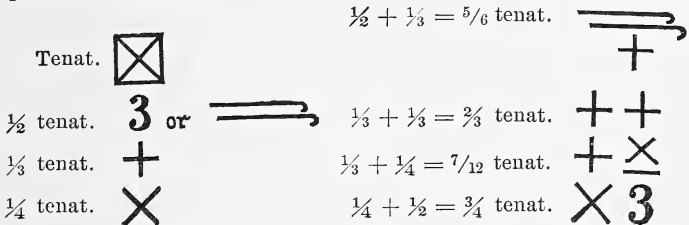
We have already made reference to the oldest known pharmacœia, an Egyptian papyrus* found in the Necropolis of Thebes. In this work the weights and measures are expressed by a number of signs, while the numbers are expressed by lines and hooks. The unit of this system of weights was probably closely related to the later Arabic *drachma* or *dirhem*, which was equal to about 3 grams, but from various considerations it is supposed that this unit was double the *drachma*, or the *di-drachma*. This unit of weight was subdivided as is now again proposed by Professor Oldberg, into halves, quarters, eighths, sixteenths, thirty-seconds, and sixty-fourths, as is seen from the symbols as used in the ancient hieroglyphics:

* See page 33.



In this work the above fractions are most frequently employed, and $\frac{1}{16}$ was especially frequently used, because it was believed that a medicine, when given in the dose of $\frac{1}{16}$ of the di-drachma, was peculiarly active.

The unit of measures of capacity was the *tenat*, which contained about 600 cubic centimeters. This measure and its subdivisions were expressed as follows:



The modern sign $\bar{a}\bar{a}$, meaning that equal quantities of several ingredients are to be taken, was expressed by writing a short perpendicular line to the right of the name of the ingredient, thus: |

A further peculiarity of this work was that the quantities were written with red ink to distinguish them from the other writing.

It will be seen from this short sketch of the oldest known system employing the dram that binary subdivision was in use nearly 3,500 years ago, and this division was afterwards lost, or discarded, probably because experience demonstrated its undesirability. At all events, whatever may be the reason of its subsequent disuse, whether it was because it was better adapted to a civilization in its infancy, and discarded as this civilization grew, thus simply going through the process found best adapted to the growing intellect of the child, or whether it was discarded from political or arbitrary motives, the effort

to turn time back thirty-five centuries, and to resurrect from among the mummies of an almost forgotten race this method of dividing the dram, when the world has nearly outgrown the dram altogether, can but meet with signal failure, and the system containing the dram of 60 grains will be replaced, not by one containing a new dram of 4 grams, but by the system which is based on the gram itself.

AVOIRDUPOIS WEIGHT.

This system of weights is used for weighing all coarse and heavy articles, or for commercial purposes generally.

The system as generally used in this country is as follows:

16 ounces	= 1 pound.
100 pounds	= 1 hundredweight
20 hundredweights	= 1 ton.

Another system, formerly used generally, but now only used in some custom house transactions, and, perhaps, in some places at coal mines, etc., is as follows:

16 ounces	= 1 pound.
28 pounds	= 1 quarter.
4 quarters	= 1 hundredweight.
20 hundredweights	= 1 ton.

And the following terms are also in use:

100 pounds of grain or flour	= 1 cental.
100 pounds of dry fish	= 1 quintal.
100 pounds of nails	= 1 keg.
196 pounds of flour	= 1 barrel.
200 pounds of pork or beef	= 1 barrel.
280 pounds of salt	= 1 barrel.
240 pounds of lime	= 1 cask.

Many articles, such as grain, dried fruits, seeds, coal, etc., are sold by the "bushel," the weight of which in regard to each separate article is fixed by law in the various states of the Union. The "bushel" in regard to these articles is, therefore, not a measure but a legal weight. Formerly the lowest denomination of this system was the grain, which was determined by act of Parliament as follows: "A cubic inch of distilled water, weighed in air by brass weights at the temperature of 62° F., the barometer being at 30 inches, is equal to 252.458 grains." The grain had been in use previous to this law, and this was only legally fixing its value, for, of course, such an odd number and fraction would not otherwise have been fixed as the value of a cubic inch of water in grains. The pound contains 7,000 such grains. The avoirdupois ounce being the sixteenth part of a pound, or of 7,000 grains, contains $437\frac{1}{2}$ grains. Formerly an avoirdupois dram (one-sixteenth of an avoirdupois ounce) was in use, which contained $27\frac{11}{32}$ grains, but this dram is obsolete in this country. Ordinarily the smallest

denomination of this system of weights is the ounce, less quantities being expressed in fractions of the ounce, or, in medical formulæ, occasionally in grains.

The term "avoirdupois" is said to be derived from *avoirs*, Fr., which means "havings," the ancient name for portable goods, property, or chattels, and *poids*, Fr., meaning "weight;" and the portable goods themselves were originally designated as *avoirdupois*, as in a law enacted during the reign of King Edward III., in the year 1353, in which it was decreed that "*we will and establish that one weight, one measure, and one yard be throughout the land, and that woolens and all manner of avoirdupois be weighed.*"

Gradually, however, the term lost this meaning, and only two centuries later, during the reign of King Henry VIII., in the year 1532, another law was promulgated, in which it was ordered that "*beef, pork, mutton, and veal shall be sold by weight called 'haverdupois.'*" It will be seen from these two quotations that the term *avoirdupois*, which had been applied in the fourteenth century to the goods themselves, had in the sixteenth century been transferred to the system of weights employed for these kinds of goods.

All of the goods which the pharmacist buys by weight are weighed with avoirdupois weights, and it is very important to remember this, although it is often forgotten. The writer has frequently heard pharmacists accusing wholesalers and manufacturers of giving short weight because 1 ounce of quinine did not contain 480 grains, or $\frac{1}{8}$ ounce of morphine is not 60 grains, but $54.68 +$ grains. It is a common error to speak of a "dram vial of morphine," although the vial contains not a dram, but $\frac{1}{8}$ avoirdupois ounce. Many pharmacists have only the apothecaries' weights from 1 ounce downwards, as used for the prescription scales, and when making their preparations they use the weights of their counter scales, or avoirdupois weights, without making allowance for the fact that each avoirdupois ounce is $42\frac{1}{2}$ grains short in weight, when compared with the apothecaries' ounces which should be used. Another common error is, in making preparations, to take 1 ounce of quinine, as purchased, for example, to make 480 1-grain quinine pills, thus making each pill about 9 per cent short weight.

The terms of the avoirdupois weights are abbreviated as follows:

The ounce,	oz.
The pound,	lb.
The hundredweight,	cwt.
The ton,	T.

While "oz.," when standing alone, generally means avoirdupois ounce, it is customary, in pharmaceutical works, to write "av. oz.," singular, and "av. ozs.," plural, to insure exactness.

The numbers are expressed in Arabic numerals preceding the signs or symbols.

TROY WEIGHT.

This system of weights is used in weighing gold, silver, and jewels, and also formerly in philosophical experiments, although for the latter purpose the metric or decimal system is now universally employed.

The table is as follows:

24 grains	= 1 pennyweight.
20 pennyweights	= 1 ounce.
12 ounces	= 1 pound.

The signs used for these weights are:

Grain,	gr.
Ounce,	oz., or troy oz.
Pound,	lb.

The term "karat" is also often used in expressing the weight of diamonds and other precious stones, and this weight is equivalent to four troy grains. When used to express the fineness of gold the karat means the *twenty-fourth part*, and "eighteen karat gold," for example, means $\frac{18}{24}$ of gold and $\frac{6}{24}$ of base metal. Troy weights are never used in medicine, although the term "troy ounce" is commonly used in medical works and formulæ. Really, however, the apothecaries' ounce is meant, which is equivalent to the troy ounce but is differently subdivided and designated by a different symbol or sign.

The derivation of the term "troy," as applied to this system of weights has been explained in different ways. One explanation is that the ounce of this system was brought from Grand Cairo, in Egypt, about the time of the crusades, and was first adopted in *Troyes*, a town in France, and at one time capital of the old province Champagne. Another explanation, however, is that *Troy novant* was an old monkish name for London, and that the term "troy weights" is, therefore, simply equivalent to saying "London weights."

In the year 1266, under King Henry III., of England, a law was enacted that *32 grains of wheat from the middle of the ear, well dried, should weigh a pennyweight, of which 20 should go to the ounce*. Twelve such ounces made the pound, and the latter, therefore, contained 7,680 grains, but as the pennyweight was afterwards reduced to 24 grains, the present troy pound contains only 5,760 grains.

The term "ounce" (*uncia*, *a*, *f.*, Lat; *once*, Fr., *unze*, G.), originally meant one-twelfth, or one of twelve, and was applied to weights as well as to measures of length. The Latin word *uncia* (probably from *unicus*, *a*, *um*, adj., meaning one and no more, sole, single) means the twelfth of the pound, or ounce, as well as the twelfth of the foot,

or inch, and various other derivative words are used in Latin, such as *semuncia*, *v*, f., half-ounce, half-inch; *sexcunx*, *uncis*, m., one and a half ounce; *quincunx*, *uncis*, m., five ounces, five inches; *sexunx*, or *sextunx*, *uncis*, m., six ounces; *septunx*, *uncis*, m., seven ounces, or seven inches, or seven-twelfths; *deunx*, *uncis*, m., eleven-twelfths, eleven portions of any weight or measure which is subdivided into twelve parts; therefore, eleven ounces, or eleven inches, etc.

Troy weight is of interest in connection with the subject of the prescription, mainly because we receive from it the grain, which serves as the unit of the system of apothecaries' weights, which is still employed in England and this country, although it has been discarded by almost all other progressive civilized nations.

APOTHECARIES' WEIGHT.

This system of weights is in vogue in a few countries, as, for instance, in Russia, England, and the United States, where it is used by physicians, druggists, photographers, and a few others. In all other countries of the civilized world it has been supplanted by a superior decimal system.

The table of this system is as follows:

20 grains	= 1 scruple.
3 scruples	= 1 dram.
8 drams	= 1 ounce.
12 ounces	= 1 pound.

It will be noticed that the ounce contains 480 grains, and is, therefore, identical with the troy ounce, for which reason the apothecaries' ounce is generally, though perhaps not quite properly, spoken of as troy ounce. The pounds of the troy and apothecaries' systems of weights are also of equal value, but in prescriptions and in medical formulæ the pound is seldom or never used, and, therefore, it would not be improper to omit the last line from the above table.

The following signs are generally used to express the quantities:

Grain,	gr.
Scruple,	℞.
Dram,	ʒ.
Ounce,	℥.
Pound,	℔.

The grain (*granum*, *i*, n.) is the same grain which is the unit of troy weight, and was based on the weight of the grain of wheat, as already explained. This weight has no fixed value, and the brass weights vary according to the country in which they are manufactured, and in consequence many of the little brass weights used in this country are uncertain and inaccurate.

It should be remembered that in Latin prescriptions the abbreviation used as a sign is always "gr.," and never "grs.," as will be explained further on. In English formulæ it is customary to write "grs." for the plural.

The scruple (*scrupulum*, *i*, n.; formerly also called *scrupus*, *scrupulus*, *scriptulus*, *scriptulus*, *i*, m., or *scriptum*, *scriptulum*, *scriptulum*, *i*, n.) was the lowest unit of weight among the ancient Romans. The word is said to be derived from a Latin word, meaning "a small stone," or pebble, such as might find its way between the sandal and foot, from which the meaning "a small objection or difficulty," or scruple, is also derived.

The word "scruple" was also used as a measure of time, length, or surface, although this use is obsolete.

Among the ancient Chaldees the scruple signified the $\frac{1}{1080}$ part of an hour, and in this sense the term was also used by the Jews, Arabs, and other Orientals. Later, the scruple was the $\frac{1}{60}$ part of an hour, and was itself subdivided into "second scruples" (*scrupulum secundum*), from which our modern designation of "seconds" is derived.

In astronomy the term scruple was also used. For instance, Rees' Cyclopædia describes: "*Scruples eclipsed*—that part of the moon's diameter which enters the shadow, expressed in the same measure in which the diameter of the moon is expressed," and the same work mentions also "*scruples of immersion, scruples of emersion,*" etc., referring to lunar eclipses.

The origin of the sign for the scruple, \mathfrak{J} , is obscure. In a paper by Chas. Rice, Ph. D., on the origin of our pharmaceutical signs for weights and measures, which was published in *New Remedies* of July, 1877, the origin of the scruple sign is thus explained: "The sign \mathfrak{J} , which has been in use for a long period, and which we now employ, derives its origin from the Greek letter *gamma* (γ), which is the first letter of the Greek word $\gamma\rho\acute{\alpha}\mu\mu\alpha$ (*gramma*, *æ*, f.), at present the *gramme* or *gram* of the metric system, but which is really the Greek equivalent for the Latin *scrupulum*. The similarity of the written character of the Greek letter *gamma*, γ , when compared with the sign for the scruple, especially as it is sometimes written, \mathfrak{J} , is quite apparent."

Another somewhat similar explanation refers to the close resemblance of the written scruple sign, as above, and a slurred written


"s," the initial letter of the Latin word *scrupulum*: \mathfrak{J}

While it is possible, in fact probable, that one of these is the correct explanation of the origin of the scruple sign as used in medi-

cine, yet it is a fact that the sign, as now printed, is of much greater antiquity than even Greek civilization.

It was used, for instance, as a letter in an unknown alphabet, a few letters of which were found engraved on a bronze celt found among the relics of ancient Rome, as will be seen by reference to a drawing



of this rude bronze implement. It also formed a character of an alphabet which was used in the inscriptions on the curious and valuable relics of the prehistoric American mound-builders, known as the Davenport tablets, although in this case there were two central strokes instead of one, as is shown in this illustration: .

In "Atlantis, the Antediluvian World," the author bases an argument in favor of his theory of a continent and civilization submerged in the Atlantic Ocean on the similarity of some of the words and characters used in writing among the Indians, Aztecs, and mound-builders of America, and among the prehistoric nations of the old world, and this sign, now used by us to designate the scruple, was one of these characters.

The fact that the scruple sign, as now used, is a prehistoric character, and occurs in various modifications in several alphabets, suggests the possibility that it may have descended to us through succeeding civilizations, perhaps from the bronze age, or even from still earlier times, but that the true history of its origin can no longer be traced.

The former use of the word *scruple* in astronomy as referring to phases of the moon's eclipses, and the suggestion of a crescent and radius in the shape of the sign as we now use it, is peculiar, though probably only a queer coincidence.

The scruple is rarely used in prescriptions at present, and the probability is that this sign will be obsolete even before the remainder of

this system of weights has finally been discarded. It is customary already to prefer to express all quantities less than a dram in grains, rather than in scruples, even when 20 or 40 grains are the desired quantities.

The *drachma* was a silver coin, the unit of the monetary system of ancient Greece. The figures give a fair representation of the two sides of the coin in natural size:



This coin varied somewhat in value in different countries and at different times, but was always the $\frac{1}{6000}$ part of a talent of silver. The Attic talent was worth about \$990; the Æginian, \$1,555; the Jewish about \$1,980. The Attic drachma was worth about 18 cents; the Æginian somewhat more. The modern drachma is worth $19\frac{3}{10}$ cents.

The *talent* was divided into 60 *minas*, each of which latter contained 100 *drachmas*. Really only 96 drachmas were necessary to make a mina, but four were added for good measure. The drachma contained six *oboli*, and there were smaller coins called *obolus*, *diabolon*, *triabolon* or *hemi-drachma*, and *tetabolion*. Two oboli made 1 scruple. There were also larger coins, as the *di-drachma*, *tri-drachma*, and *tetra-drachma*. All of these coins were also used as weights, the talent weighing about 26·20 kilos. The drachma varied in weight, the average weight of five in the British Museum being 60·92 grains each, but some of 68·10 grains in weight are also known.

The word *drachma*, α, f., is said to have originally meant "a handful" (*δραχμή*, from *δράσσειοσσαι*, to grasp with the hand), because a man could grasp six small bars of iron, called *oboli*. In more modern pharmaceutical language a word derived from the same root is used, namely *dragmīs*, ις, f. (*δραγμαίς*), a small handful, applied to a measure for teas, species, etc.

The Italians, in their language, dropped the harsher sound of "ch" and changed the word to "dramma," from which we get our word "dram."

Another explanation of the word *drachma* is that it is from the Arabic *drahm*, which was derived from two words meaning "away" and "to spend," and referred to the amount a traveler would spend in a day.

The origin of the dram sign, ℥, is explained in several ways, the

most probable being that it is derived from the Egyptian weights. By referring to page 41 it will be noticed that the sign for "one-half" tenat is a figure resembling the modern Arabic numeral 3, or the sign of the dram, ζ . The Egyptian unit of weight was equivalent to the later Greek *di-drachma*, or two drams. The sign for "one-half" was not only used to designate measure, but also to designate weight, and then meant half a *di-drachma*, or a weight which later on became the unit of weights among the Greeks, the *drachma*, and it was but natural that the Greeks adopted the Egyptian symbol to express this weight, and through them it has descended to our times. This character is also one of the letters of the ancient Phœnician, Hebraic, or Samaritan alphabet. It is also one of the letters of the Egyptian hieratic alphabet, which has the same relation to the hieroglyphic alphabet as our written letters have to the printed characters. The hieratic character stood for the hieroglyphic "owl," meaning "m," and this probably accounts for the figure of the owl on one side of the Greek drachma coin.

The division of the dram into sixty grains, or of the scruple into twenty grains, is comparatively modern, as the grain itself only dates back to the year 1266.

The term ounce was applied to the twelfth part of any magnitude, whether of length, surface, or capacity, and meant a twelfth part of the pound, or an ounce, as well as the twelfth part of a foot, or an inch. The ounce (*uncia*, *æ*, *f.*), consisting of eight drams, was one of the weights of ancient Greece, and $12\frac{1}{2}$ ounces made one *mina*, about equivalent to our pound. The extra half ounce required to make the mina was due to the four drachmas given for good measure, as already explained.

Various explanations of the origin of the sign for the ounce, ζ , have been given. It is possible that it was derived from the dram sign by adding an extra hook to indicate that it was the next higher denomination of weight. Mr. Chas. Rice, Ph. D., in the article already referred to, gives the following explanation: "The sign for *ounce*, ζ , is nothing else than the Greek letter ξ (x). Its origin admits of two explanations. The Greek fluidounce, which was called *baphion*, or *oxybaphion* ($\acute{o}\xi\upsilon\beta\acute{\alpha}\phi\iota\omicron\nu$, $O\xi\Gamma\beta\alpha\phi\iota\omicron\nu$), bore a certain relation to the solid ounce (it held nearly two ounces). It was usually denoted by the first two letters, written from the right to the left, thus: ΞO , or ξo . Finally, the letter ξ (x) may have been chosen alone, to denote the solid ounce. A much more probable explanation, however, is this, that the Greek word for ounce, *uggia*, pronounced *ungia* ($\acute{o}\upsilon\gamma\gamma\iota\alpha$, $O\Upsilon\Upsilon\Gamma\iota\alpha$), has itself given rise to the sign. Namely, the two central *g*'s of the word have been joined to a sort of monogram, which bore a great resemblance to the letter Ξ (X), in place of which the smaller letter ξ (x) was naturally substituted in current handwriting."

The signs for the pound, lb. and lb., are simply abbreviations of the Latin word *libra*, *æ*, f., a balance, a pound. The sign, lb., without the stroke should be used for the avoirdupois pound of sixteen ounces; the sign, lb., with the stroke, for the troy and apothecaries' pound of twelve ounces each. The stroke in the latter sign represents the beam of a balance. Among the Romans the pound was often designated

L̄P. also **℥** or **lb.** In the central figure of

the first of these signs we find a rude effort to picture a beam balance, and the two letters stand for "a pound's weight," *Libra Pondus*. In the second sign the attempt to represent a beam balance is unmistakable, and both together serve to explain clearly the origin of the transverse stroke in lb and its near relative, £.

USING ONLY GRAIN WEIGHTS.

In the construction of many formulæ it will be found very convenient to use only grains, ignoring all higher denominations entirely. This saves much calculation, but, on the other hand, necessitates the purchase of a set of weights of 1,000 grains and less. Such sets are to be had, consisting of 1,000, 500, 200, 200, 100, 50, 20, 20, 10, 5, 2, 2, and 1-grain weights, and fractions of a grain. It is also well to buy a number of extra weights of 2,000, 2,000, 5,000, and 10,000 grains each.

In manufacturing processes the metric system is so far superior in convenience to all other systems, that the writer would dislike to go back to the old weights. But there are a large number of preparations commonly sold which can not well be made by using metric weights, unless apothecaries' weights are first translated or transposed into grams. Such transpositions, however, introduce chances of error, where otherwise none would exist, and under such circumstances it is better to use apothecaries' weight. This is the case, for example, in making elixirs, in which the teaspoonful or dessertspoonful contains a certain portion of a grain or a number of grains of some remedy; or in pills made to contain certain quantities in grains.

If it is desired to make 10 gallons of an elixir containing 2 grains of some certain alkaloidal salt in each teaspoonful, it is, of course, necessary to ascertain how many teaspoonfuls are contained in this quantity, and a tedious calculation is required to reduce the 10 gallons to minims. Ten gallons is equal to 614,400 minims; the teaspoonful equals 75 minims; 10 gallons, therefore, contains 8,190 teaspoonfuls, and as each of these is to contain 2 grains, 16,380 grains of the alkaloidal salt will be required. It is easier to make out a formula, saying 16,380 grains, than to reduce all this again to drams, ounces, and pounds.

The advantage of using grains alone is clearly appreciated in formulae for pills, as in this example:

Compound Cathartic Pills.

Each pill contains	
Compound extract of colocynth.....	1 ³ / ₁₀ grs.
Abstract of jalap	1 gr.
Mild chloride of mercury.....	1 gr.
Gamboge	$\frac{1}{4}$ gr.

Now, if we wish to make pills in large quantities we must adjust the formula for the mass to our machine; if the latter cuts 50 pills, we determine the number of boluses to be cut, which will be 2, 4, 8, 16, 32, 64, 128, or some number obtained by continuous multiplication by two, because the mass is made into suitable boluses by subdividing into equal halves until the proper sized boluses are obtained. Suppose that we wish to make out a formula for 128 boluses, or 6,400 pills. Multiplying the ingredients of 1 pill by 6,400, we obtain the following:

Take of	
Compound extract of colocynth.....	8,320 grs.
Abstract of jalap.....	6,400 grs.
Mild chloride of mercury.....	6,400 grs.
Gamboge.....	1,600 grs.
Water.....	1,230 grs.

We will suppose that a trial shows that 1,230 grains of water will just suffice to make a proper mass; we then divide into 128 boluses and cut one on the machine. We find that the mass will not roll out to 50 pills, but only to 47 pills. We carefully knead in powdered licorice root, or other appropriate inert substances, until the mass cuts exactly into 50 pills; if it was necessary to add 5 grains licorice root to do this, we add that much for each bolus, or a total of 640 grains. It may be necessary also to add 30 grains more of water. This must be thoroughly worked up together, and also added to the formula, which will then be as follows:

Take of	
Compound extract of colocynth.....	8,320 grs.
Abstract of jalap.....	6,400 grs.
Mild chloride of mercury.....	6,400 grs.
Gamboge.....	1,600 grs.
Powdered licorice root.....	640 grs.
Water.....	1,260 grs.

Mix the powders thoroughly; add the water, and make a mass; divide into 128 boluses, each of which is to be cut into 50 pills on the No. 4 machine.

The numbering of the machines is here supposed to be an arbitrary method used in the laboratory to designate the particular machine to which the formula was adjusted, and is not a number that means anything at all outside of the writer's laboratory. The ordinary trade designation of pill machines, as five-grain, three-grain, two-grain, etc.,

is meaningless, and not even true of blue mass, to which these terms are supposed to apply. Now, such a formula would be awkward in appearance, and it would be difficult to either increase or diminish the size of the mass if the quantities were given in pounds, ounces, drams, and grains, thus:

Take of

Compound extract of colocynth	1 lb., 5 ozs., 2 drs., 40 grs.
Abstract of jalap	1 lb., 1 oz., 2 drs., 40 grs.
Mild chloride of mercury	1 lb., 1 oz., 2 drs., 40 grs.
Gamboge	3 ozs., 2 drs., 40 grs.
Powdered licorice root	1 oz., 2 drs., 40 grs.
Water	2 fl.ozs., 5 fl.drs.

Mix, and divide into 6,400 pills.

It might also be convenient in extemporaneous prescriptions to use grains alone, discarding the drams and ounces. This would give us many of the advantages of the metric system, and do away with many of the disadvantages of the apothecaries' weights, but, of course, it would be better to adopt the metric system altogether.

LIQUID MEASURE.

Measures of capacity are of two kinds, measures of liquids and measures of dry substances. In medicine dry substances are never measured, but always weighed. The unit of capacity for liquids is the *gallon*, and for solids the *bushel*.

The table for liquid measure is

4 gills	= 1 pint.
2 pints	= 1 quart.
4 quarts	= 1 gallon.

The signs of abbreviation are: .

Gill,	gi.
Pint,	pt.
Quart,	qt.
Gallon,	gal.

The barrel (*bbl.*) is thirty-one and one-half gallons, and the hogshead (*hhd.*) is sixty-three gallons, but these are not fixed measures, but vary considerably when used for commercial purposes. The tierce, hogshead, pipe, butt, and tun are other terms used to designate casks used for various kinds of liquids, but have no fixed value of capacity.

APOTHECARIES' LIQUID MEASURE.

60 minims	= 1 fluidram.
8 fluidrams	= 1 fluidounce.
16 fluidounces	= 1 pint.
8 pints	= 1 gallon.

The signs used in prescriptions and formulæ are as follows:

Minim,	℥.
Fluidram,	f℥.
Fluidounce,	f℥ss.
Pint,	O.
Gallon,	Cong. or C.

The minim (*minimum*, *i*, n., the smallest part), is used for measuring small quantities of liquids. The sign, ℥, is merely the initial letter of the word.

The sign for the fluidram (*fluidrachma*, *æ*, f., "the measure of a dram of water") is simply the sign of the dram, with the letter "f" (fluid) prefixed, f℥. In English formulæ it is often written "fl. dr."

The sign for fluidounce (*fluiduncia*, *æ*, f., "the measure of an ounce of water") is the sign of the ounce with an "f" (fluid) prefixed. In English formulæ it is often written "fl. oz."

The pint is not used in prescriptions, though it is sometimes used in formulas. The sign, O, is an abbreviation of the Latin name *octarius*, *ii*, m., meaning "an eighth part," referring to the fact that it is the eighth part of a gallon. This measure is of modern origin, and was not used by the ancients. In English formulæ it is customary to write "pt."

The gallon is rarely used in prescriptions or formulas. The sign *Cong.* or *C.* is an abbreviation of *congius*, *ii*, m., the gallon, which, anciently, was the eighth part of the *amphora* (*amphora*, *æ*, f., a pitcher or jug, from the Greek *αμφί-φέρω*, carry). The word *congius* is derived from the Latin word *concha*, *æ*, f. (Gr. *κόγχος*), the mussle-shell, or conch, which was used as a drinking vessel. In English formulas we write "gal.," or "gall."

LINEAR MEASURE.

The only measures of length, except metric measures, which are used in prescriptions are the line, inch, and foot, and occasionally the yard.

Table of Linear Measure.

12 lines	= 1 inch.
12 inches	= 1 foot.
3 feet	= 1 yard.

The signs are as follows:

Line,	'''
Inch,	" or in.
Foot,	' or ft.
Yard,	yd.

The line and inch are sometimes used in designating the sizes of

plasters, etc., and the foot and yard in ordering bandages, but all of them are but rarely employed in prescriptions.

Incidentally, it may be remarked that the division of the foot into inches and lines (or into twelfths and one-hundred-and-forty-fourths) is so inconvenient, that in civil engineering, surveying, and for similar purposes, the foot is often divided into tenths and hundredths, showing here also the urgent necessity of abandoning the old and inconvenient forms, and substituting therefor an advanced and rational decimal system of measures. This division of the foot into tenths and hundredths is merely a make-shift until the metric system is finally adopted in this country.

NECESSITY OF AN INTERNATIONAL DECIMAL SYSTEM OF WEIGHTS.

With the advancement of civilization and its attendant progress in regard to commerce, and especially since rapid communication by railroads, steamboats, and telegraphs has almost annihilated distance and time, and has brought continents and nations much nearer to each other, so that our world is now only a very small globe indeed, it has become more desirable that there should be one cosmopolitan or international system of weights and measures, as well as of money, postal service, language, etc.

This world is becoming altogether too small to make it possible to continue using so many different systems of money and of weights and measures as are now in use, and it is altogether probable that one system of each will eventually displace all others, and it is, therefore, of great importance to determine which one this is likely to be, and then to aid in its introduction.

As already stated in previous pages, the coming international monetary system must be decimal, and dollars, dimes, and cents will probably soon be used all over the world; so also, the system of weights and measures must be decimal, and the first used decimal system has the advantage in regard to chances of universal adoption. It is safe to say that if any nation had used for centuries a system employing the grain, perhaps, as follows:

10 grains	= 1 scruple,
10 scruples	= 1 dram,
10 drams	= 1 ounce,
10 ounces	= 1 pound, etc.,

then, when steamboats and locomotives brought our antipodes within a few days' traveling distance, and the telegraph enabled us to read in the morning's paper what had occurred on the other side of the world at noon there of the same day, that such a decimal system might have had a fair chance of general adoption.

But no decimal system including the grain was in use, and when the desirability of an international system of weights became felt, the only decimal system of weights and measures then known was adopted by one nation after another, until now but few nations exist which do not employ it. This system is the decimal or metric system.

Professor Oscar Oldberg says: "This system was not the work of any one mind, nor of any one nation. It was the legitimate offspring of the times. In its conception and development, as in its steadily increasing domain, no nation can claim it as its own; but France had the honor of being the first to adopt it. It has continued to spread until adopted by more than one-half of the inhabitants of the civilized world. It is obligatory by law in the following countries: Argentine Confederation, Austro-Hungary, Belgium, Brazil, British India, Chili, Costa Rica, Ecuador, Egypt, France, French Colonies, Germany, Greece, Guatemala, Italy, Mexico, Netherlands, Dutch Colonies, Norway, Peru, Portugal, Roumania, Spain, Spanish Colonies, Sweden, Switzerland, Turkey, United States of Columbia, Uruguay, and Venezuela. The aggregate population of these countries is about 500,000,000.

"The metric system is in part obligatory in Denmark and its colonies; population about 2,000,000.

"It is permissive in Great Britain, the British Colonies, and the United States, with an aggregate population of about 100,000,000.

"The only country in which the metric system is not permitted for commercial transactions is Russia, with a population (including its dependencies) of about 90,000,000. For scientific purposes, the metric system is in universal use. * * *

"The metric system is now used in the pharmacopœias of Austria, Belgium, Denmark, France, Germany, Greece, Mexico, Norway, Russia, Sweden, Switzerland, and the United States. In the last named Pharmacopœia, however, the troy grain is also used in part.

"Most of the best works on chemistry, pharmacy, and materia medica in all languages now use the metric system." †

In the light of these facts, can any one doubt which system of weights and measures is destined to be the successor of all others, and to become cosmopolitan? and must not all efforts to retard the consummation of this final result appear as the futile effort of short-sighted obstructionists who vainly attempt to stem the on-rushing tide of human progress and civilization?

We may rest assured that whether we individually favor or oppose the use of the metric system, its intrinsic merits, as well as its adventitious advantages, are such that it will continue to spread until it is *the* system of the world, by which all mankind "from Greenland's icy

†Weights, Measures, and Specific Gravity, by Oscar Oldberg, Pharm. D., 1885.

mountains to India's coral strand" will weigh and measure. Our opposition may delay this, but will not prevent it.

It is true that there are some who think that the metric system may progress until it is finally adopted for all purposes, *except* for the particular purpose for which they themselves use it. Thus, there are photographers who write in their journals in favor of troy weights for photographers; or pharmacists or physicians who admit the superiority of the metric system of weights and measures for all other purposes, *except for medicine and pharmacy*, thinking, in their short-sightedness, that medicine and pharmacy can stand still while all the world else progresses. But no branch of human knowledge or thought can stand still. The Genius of the Age urges it on, and it must progress with the other branches of science or perish altogether.

In pharmacy and medicine there can be no rest or cessation of advancement until there is one universal pharmacopœia, with one universal system of weights and measures, so that a prescription written anywhere may be compounded alike in all the pharmacies of the world; and individual physicians or pharmacists who can not, or will not, keep pace with the advancing strides of their professions, will simply be dealt with according to the fixed laws which result in the "survival of the fittest."

The evidently predestined universal use of the metric system of weights and measures for all purposes, including medicine and pharmacy, makes it desirable that we should consider it carefully, so that we, each one of us, may be able to use it readily, and thus aid, rather than obstruct, the evident tendencies of the times.

THE METRIC SYSTEM.

Several decimal systems of weights and measures have been proposed, but none of them ever came into use except the metric system. This system is so called because it is based upon the meter, from the Greek, μέτρον, measure.

It is immaterial what forms the unit of any system, and an arbitrary weight, as the grain of wheat, which gave rise to our grain weight, will answer as well as any other, provided it is afterwards defined by law to become of fixed and absolute value. So the meter might originally have been an arbitrary length without affecting the value of the system thereby. But it was deemed advisable to make the meter of such a definite value that if all traces of these weights and measures were to be annihilated the meter could be readily replaced.

The meter is the one-ten-millionth part of the distance from the earth's equator to the pole, and may, of course, be calculated again at

any time, if necessary. The standard meter is made of platinum, and is, therefore, not corrodible; it is kept in Paris, in a fire-proof building, and as its length varies with the temperature, it must be measured at 0° C. According to this standard the standard weights and measures of all other countries have been prepared so that the meter may be the same all over the world.

From the meter, which is the unit of length, all other units, as of measures of surface, of cubic contents, and of weights, have been obtained.

The *meter* is equivalent to 39·37+ inches, or, approximately, to 40 inches. It is the unit for measures of length; used like our yard.

A square having sides of ten meters, or 100 square meters, is called *Are*, and is the unit of measures of surface, as of land. This term is used like our word *acre*.

A cube, each of whose faces is one-tenth of a meter square (one *cubic decimeter*), is called *Liter*, and is the unit for measures of capacity. It is a little more than one quart.

A cube, each face of which is one one-hundredth of a meter square, or one *cubic centimeter*, is equal to the thousandth part of a liter; and the weight of one cubic centimeter of pure distilled water, weighed *in vacuo*, with water at its greatest density (4° C. or 39·2° F.) is a *gram*, which is the unit of weight.

The other denominations of the metric system are named by prefixing Greek syllables to express the upward scale, and Latin syllables to express the downward scale, or decimal fractions, thus:

Greek	{	Deca, from δέκα, deca, ten.
		Hecto, from ἑκατόν, hecaton, hundred.
		Kilo, from χίλιοι, kilioi, thousand.
		Myria, from μυριάς, myrias, ten thousand, or many.
Latin	{	Deci, from decima, <i>a</i> , f., the tenth part.
		Centi, from centesima, <i>a</i> , f., the hundredth part.
		Milli, from millesima, <i>a</i> , f., the thousandth part.

In writing any quantity, however, it is not customary to write the names of these different denominations, but to write them in the form of whole numbers and fractions, in a similar manner as we write dollars and cents; we write \$1.15, and not \$1, 1 dime, and 5 cents.

Applying the prefixes to the gram, we have the following denominations:

Pronounced.	Written.
Myriagram, or 10 kilos.....	10,000· grams, or 10 kilos.
Kilogram, or kilo.....	1,000· grams, or 1 kilo.
Hectogram.....	100· grams.
Decagram.....	10· grams.
Gram.....	1· gram.
Decigram.....	0·1 gram.
Centigram.....	0·01 gram.
Milligram.....	0·001 gram.

Different opinions have been held in regard to the proper method of spelling the word "gram," many preferring "gramme" to the ordinary English method of spelling it, on the ground that there is not sufficient difference between *gram* and *grain*. But, as the word is not spelled in full in prescriptions, and the abbreviation Gm., with a capital G and a heavy line underneath, is generally used, together with Arabic numerals, it probably makes little difference how the word is spelled. If any one has not formed a habit of writing it in either way it might, perhaps, be advisable to write "gramme," as long as the old system of grains is still in use.

It is not customary in this country to use the ascending terms, except the kilogram. We prefer to say "one hundred grams" rather than "one hectogram." The word *kilogram* is used similarly as the term *pound* is ordinarily employed. It is the unit for weighing commercial quantities of heavier goods, which are sold by weight. Crude drugs are sold by the kilogram (abbreviated to "kilo"). A bale of cinchona, for instance, contains from sixty to one hundred "kilos," or, approximately, twice as many pounds, the kilo being equal to 2·20+ avoirdupois pounds.

The above prefixes are used with other metric terms as well; with the meter, for example, we have myriameter, kilometer (used as a unit as we ordinarily use the mile), hectometer, decameter, meter, decimeter, centimeter, and millimeter.

In expressing quantities of weight or measure in prescriptions, we use only the *gram* and the *cubic centimeter* as units, and express all quantities, either as whole numbers to express one or more than one unit of each kind, or as fractions to express quantities less than one unit of a kind. When it is necessary to express linear measures in prescriptions, the meter and its subdivisions are used.

The following abbreviations are occasionally employed:

Meter,	<i>M.</i> or <i>m.</i>
Decimeter,	<i>Dm.</i> or <i>dm.</i>
Centimeter,	<i>Cm.</i> or <i>cm.</i>
Millimeter,	<i>Mm.</i> or <i>mm.</i>

In microscopical measurements the one-thousandth part of a millimeter is often used as the unit of measurements, and is called *micromillimeter*. As an abbreviation, the Greek letter *m* is used, thus: μ .

The following abbreviations for weights have been used in prescriptions:

Gram,	<i>G.</i> , <i>Gm.</i> , or <u>Gm.</u>
Decigram,	<i>Dg.</i> or <i>dgm.</i>
Centigram,	<i>Cg.</i> or <i>cgm.</i>
Milligram,	<i>Mg.</i> or <i>mgm.</i>

The abbreviations for the subdivisions of the gram are, however, rarely employed, and errors are less likely to occur if we discard them

altogether and express these quantities as fractions of the gram: or, if we use these terms, we should write them out in full.

Of liquid measures only the *cubic centimeter* is used in prescriptions; abbreviated C.c. In formulæ for larger quantities the liter is sometimes used. The liter is written *L*.

In writing any quantity in metric terms in a prescription, we write the name of the quantity, preceded by the number in Arabic characters, as in the following example:

R—Morphinæ sulphatis,	0·10 Gm.
Quininæ sulphatis,	2·50 Gm.
Acidi sulphurici diluti,	q. s.
Tincturæ cardamomi compositæ,	10·00 C.c.
Syrupi sacchari,	25·00 C.c.
Aquæ puræ,	165·00 C.c.
Misce et signa: Tablespoonful three times a day.	

When less than one gram or one cubic centimeter is taken the decimal point is emphasized by placing a zero in the unit place, as above. To avoid all errors from any misplaced or omitted decimal point, it has been suggested to use a decimal line, thus:

R—Opii pulveris,	0 | 25 Gm.
Quininæ sulphatis,	5 | 00 Gm.
Extracti gentianæ,	q. s.
Flat massa et divide in pilulas XXX.	
S.: One pill night and morning.	

Still another plan suggested is to rule the prescription blanks as for dollars and cents, only that we must have four spaces instead of two for the fractions, and that the denominations of the fractions are printed above the columns as in the following example:

	Grams.	Dg.	Cg.	Mg.	..
R—Strychninæ sulphatis,	0	0	5	..	..
Extracti belladonnæ,	0	2	0	..	..
Extracti colocynthidis compositi,	7	5	0	..	..
Misce et divide in pilulas L.					
Signa: One pill at bed-time.					

In the above examples the abbreviation Gm. for gram can not be mistaken for the abbreviation gr. for grains, because the latter is always written first with a small g, and with the number following in Roman numerals.

In European countries it is customary in dispensing to weigh liquids as well as solids, and only the gram and its fractions are used. This is so thoroughly understood that no abbreviation for the gram is necessary at all and only numbers are written.

R—Magnesii sulphatis,	25·
Extracti sennæ fluidi,	10·
Syrupi zingiberis,	15·
Aquæ, q. s. ad,	200·
Misce. Signa: Tablespoonful every two hours.	

If we could have the general agreement in this country that *all solids are to be dispensed by weight and all liquids by measure*, this last plan would be the plainest, and, therefore, best. We would read grams for solids and cubic centimeters for liquids and dispense accordingly.

When any one wishes to adopt the metric system for use in prescribing, he should attempt to *think* in metric terms as soon as possible, because a mere transposition of the quantities into metric terms after having been thought and calculated in the old apothecaries' terms is not a proper use of the newer and better system, any more than a man can be said to write in the English language who first writes an article in a foreign language, and then laboriously translates into English. His English composition will not only be awkward in style, but it will betray its origin in its idiomatic construction, and will merely be German, French, etc., as the case may be, clothed in English garb. So, also, we often see metric prescriptions in different medical works which show unmistakable signs of having been originally constructed with grains, drams, and ounces.

There are different methods of acquiring the habit of thinking in metric terms, some of which appear to involve much unnecessary labor, and retard, rather than facilitate, the introduction of the decimal system. We may safely assert that any plan which gives rules for the *exact* conversion of apothecaries' weights into grams will not succeed in teaching any one to use the metric system properly, and will make the acquisition of an ability to write metric prescriptions fluently appear as a formidable undertaking, when, in reality, it is exceedingly simple and easy.

Rules for converting grains into grams, or *vice versa*, with mathematical exactness are superfluous under all ordinary circumstances, for when exactness is really desirable it can be better secured by referring to tables of equivalent quantities, and when it is not necessary, these rules are too cumbersome and tedious for practical use.

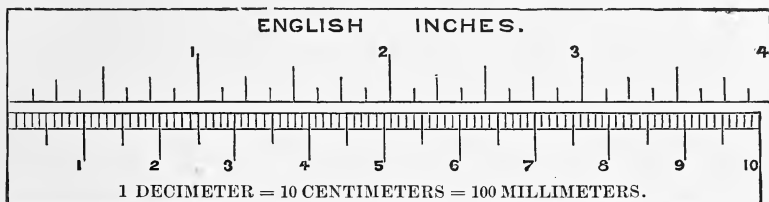
If rules for conversion are used at all, they should be so simple that they can be used mentally and instantly.

The easiest and quickest method probably is to simply memorize the equivalent values of a number of the more familiar quantities, and then from them calculate other quantities that we may meet with. We commence with a small list, and go over it until all proportions are perfectly fixed in the memory. Then, we may enlarge the table and memorize this also. For example, we memorize some such tables as the following:

Equivalents of Linear Measure.

1 line	= about 2 millimeters, or 0.002 meters.
1 inch	= about 25 millimeters, or 0.025 meters.
1 foot	= about 30 centimeters, or 0.30 meters.
1 yard	= about 90 centimeters, or 0.90 meters.

To realize this relationship, it will be well to carefully compare the scale of one decimeter and its subdivisions with the scale of four inches and its subdivisions in the accompanying figure.



Next we try to realize and memorize measures of capacity. The scale representing one decimeter in the above figure serves to construct a measure of capacity. A cubic decimeter is one liter, as already explained.

Equivalents of Fluid Measure.

15 minims	=	about 1 cubic centimeter.
1 fluidram	=	about 4 cubic centimeters.
1 fluidounce	=	about 30 cubic centimeters.
1 pint	=	about 0.5 liter, or 500 cubic centimeters.
1 quart	=	about 1 liter, or 1,000 cubic centimeters.

Equivalents of Weight.

1 grain	=	about 0.06 gram, or 6 centigrams.
15 grains	=	about 1 gram.
1 dram	=	about 4 grams.
1 troy ounce	=	about 30 grams.

For use in learning to construct a metric prescription, it becomes necessary to adopt some easy rules for conversion from apothecaries' to metric weights. The simplest method is as follows:

Multiply ounces by 30 to get the number of grams. Multiply drams by 4 to get the number of grams. When there are less than 60 grains divide by 15 to ascertain the number of grams. If there is a remainder, or if the number of grains is less than 16, we may reduce to fractions of a gram, as follows:

Assume the gram (written 1.00 Gm.) to be equal to 15 or 16 grains. To convert any number of grains less than 16 into centigrams, think what fraction that number is of 15 or 16, as may be most convenient, and then take that fractional part of 1.00 gram to express the metric equivalent, ignoring fractions beyond the second decimal place.

The following will make this clear:

1 grain	=	1/16 of 16 grains;	1/16 of 1.00 gram	=	0.06 gram.
2 grains	=	1/8 of 16 grains;	1/8 of 1.00 gram	=	0.12 gram.
3 grains	=	1/5 of 15 grains;	1/5 of 1.00 gram	=	0.20 gram.
4 grains	=	1/4 of 16 grains;	1/4 of 1.00 gram	=	0.25 gram.
5 grains	=	1/3 of 15 grains;	1/3 of 1.00 gram	=	0.33 gram.
6 grains	=	2/5 of 15 grains;	2/5 of 1.00 gram	=	0.40 gram.
8 grains	=	1/2 of 16 grains;	1/2 of 1.00 gram	=	0.50 gram.
9 grains	=	3/5 of 15 grains;	3/5 of 1.00 gram	=	0.60 gram.
10 grains	=	2/3 of 15 grains;	2/3 of 1.00 gram	=	0.66 gram.
12 grains	=	3/4 of 16 grains;	3/4 of 1.00 gram	=	0.75 gram.

Or we remember that a grain equals 0.06 gram, and multiply this by the total number of grains. For instance 20 grains = 20×0.06 gram, or 1.20 grams; 35 grains = 35×0.06 gram, or 2.10 grams.

In some parts of the country the custom still prevails of using the "bit" in stating money values—eight bits making a dollar, and the bit being, therefore, $12\frac{1}{2}$ cents, written $0.12\frac{1}{2}$ dollars; "two bits," "four bits," and "six bits" are \$0.25, \$0.50, and \$0.75 respectively. The uneven number of bits are rarely employed, but three bits would be $\$0.37\frac{1}{2}$, five bits $\$0.62\frac{1}{2}$, and seven bits $\$0.87\frac{1}{2}$. To any one familiar with these "bits," the conversion of grains to grams offers no difficulty. Two grains equals $0.12\frac{1}{2}$, or 0.125 grams, which fraction is written like one bit. Therefore, *divide the number of grains by 2, and write the fraction of a dollar for that number of bits.* For instance, to convert 12 grains: $12 \div 2 = 6$; six bits is \$0.75; omit the dollar sign and substitute the gram sign and it is done; to convert 9 grains: $9 \div 2 = 4\frac{1}{2}$; $4\frac{1}{2}$ bits is \$0.56. Or, when the number of grains is uneven, we may divide by 2, ignoring the fraction, taking the value of that number of bits and adding 6 cents for the odd grain; to convert 5 grains: $5 \div 2 = 2$; "two bits" is \$0.25, to which we add 6 cents, which makes \$0.31; therefore 0.31 gram, or, for appearance's sake, 0.30 gram.

While the above equivalents and rules for the conversion of apothecaries' weights into metric quantities are only approximately correct, they are sufficiently accurate for all practical purposes; and as they can be used mentally, they may serve a valuable purpose during the transition period, while the physician still thinks in the old terms, but writes in the new. A short time of practice, however, will soon enable him to use the metric terms without any mental reference to grains. When we use metric terms we should try to use whole or fractional numbers that are multiples of five or ten as far as possible, partly because the decimal prescription looks better when thus written, and partly because the weights are made according to this plan and the graduates are engraved with gradations of five and ten cubic centimeters. Besides, the bottles made for metric prescriptions contain 10, 25, 50, 75, 100, 150, 200, 250, etc., cubic centimeters, and these bottles should be filled just as it is the aim of the physician to prescribe a quantity of fluid that may about fill the $\frac{1}{2}$, 1, 2, 4, and 6-ounce vials. It does not look any better to dispense 180 cubic centimeters in a 200-cubic-centimeter vial than to dispense 5 fluidounces in a 6-ounce vial.

Suppose, then, that we are beginners in the use of the metric system, and must still construct our prescriptions according to the old plan, or with quantities in apothecaries' weights, and that we wish to prescribe the following:

R—Copaibæ,	f ʒ i.
Acaciæ pulv.,	
Aquæ, āā q. s. ut ft. emuls.	f ʒ v.
Adde	
Spir. lavandul. comp.,	f ʒ ii.
Syr. toltutan.,	f ʒ i.

M. S.: Tablespoonful every three hours.

We write out the whole of the formula, only omitting the quantities, thus:

R—Copaibæ,	
Acaciæ pulv.,	
Aquæ, āā q. s. ut ft. emuls.	
Adde	
Spir. lavandul. comp.,	
Syr. toltutan.,	

M. S.: Tablespoonful every three hours.

The emulsion we wish to prescribe, as above, is to measure about 6 fluidounces; 6 fluidounces, however, are equal to about 6×30 , or 180 cubic centimeters. The next size of metric bottle is one of 200 cubic centimeter capacity, and we determine to fill that. One-sixth of the emulsion is to be copaiba; one-sixth of 200 cubic centimeters is 33 cubic centimeters, but, as already explained, we prefer a multiple of 5, and, therefore, write 35 cubic centimeters. This is to be mixed with acacia and water to make 5 fluidounces of emulsion; 5×30 cubic centimeters = 150 cubic centimeters. To this is to be added 2 fluidrams of compound spirit of lavender; 2×4 cubic centimeters = 8 cubic centimeters, but as the whole mixture is somewhat increased, we increase the quantity of the spirit to an even decimal number—10 cubic centimeters. This added to the 150 cubic centimeters of emulsion is 160 cubic centimeters, and to make the desired 200 cubic centimeters we need 40 cubic centimeters, which is the measure we take of the syrup. This is, of course, a mental calculation, and requires scarcely as much time as it takes to read it, and then we write down the quantities after the names of the ingredients. Our prescription will then appear as follows:

R—Copaibæ,	35 C.c.
Acaciæ pulv.,	
Aquæ, āā q. s. ut ft. emuls.	150 C.c.
Adde	
Spir. lavandul. comp.,	10 C.c.
Syr. toltutan.,	40 C.c.

M. S.: Tablespoonful every three hours.

We carefully look this over to see that we have made no error, and then the prescription is done. In a few weeks we will become so familiar with metric terms that we can write the prescription without first thinking it out in apothecaries' weights and measures, although, for safety's sake, we may prefer for a time to verify our metric pre-

scriptions by mentally transposing to the old and more familiar quantities.

When once we have acquired the ability to use the metric system, we can not help but become charmed with its scientific simplicity and beauty, and will not desire to return to the use of the old system. Those who are best and alone able to judge regarding the comparative merits of the two systems—namely, those who have used and thought in both systems—are unanimous in their preference for the decimal metric system. The opposition to the metric system comes from those who either have never studied the system at all, owing to prejudice or laziness to devote a little time and trouble, and who are, therefore, really incompetent to form any opinion at all on the subject, and ought to have the good grace to acknowledge this, or from those who have devoted some time to the study of the system, but have never acquired the ability to think in this system. To the latter class it then necessarily appears as a cumbersome system, and as one that involves chances for errors that would be avoided by the use of grain weights.

It should, therefore, be the aim as soon as possible to learn the metric doses of remedies and to think in metric terms, in order that the system may be used in a proper manner in prescribing, and it will prove profitable to devote an hour a day for a week or two to taking the prescriptions on a druggist's file and changing them to metric prescriptions, as above explained.

As it is the custom in this country to give medicines to the patient in measured doses (teaspoonful, etc.), the calculations of doses and of total quantities to be dispensed are based on the measures of the liquid ingredients, and not on their weights. To prescribe and dispense by weight would make it necessary for the physician to remember the specific gravity of every fluid extract, tincture, solution, syrup, etc., and to calculate the weight of each such ingredient, so that he may obtain the desired total volume of medicine. This involves too much trouble and too many chances for errors in prescribing, so that it is to be hoped that both the pharmaceutical and medical professions will insist on prescribing and dispensing solids by weight and liquids by measure.

Under certain circumstances it may be desirable to use exact equivalents, and then it may be remembered that the gram equals 15.432+ grains. This number is easily memorized by writing the figures in descending order, beginning with 5, then 4, 3, 2, and when 1 is reached writing this before the 5 instead of after the 2, and then placing the decimal point after the 5.

The second column of the following table gives exact metric equivalents for the apothecaries' weights in the first column :

Conversion of Apothecaries' Weight to Metric Weight.

Apothecaries' weight.	Metric weight.	Apothecaries' weight.	Metric weight.
1/60 grain.....	0·001	80 grains (℥iv).....	5·18
1/30 ".....	0·002	90 " (℥iss).....	5·83
1/20 ".....	0·003	100 " (℥v).....	6·48
1/10 ".....	0·006	120 " (℥ii).....	7·77
1/8 ".....	0·008	150 " (℥iiss).....	9·72
1/6 ".....	0·011	160 ".....	10·36
1/5 ".....	0·013	180 " (℥iii).....	11·66
1/4 ".....	0·016	200 ".....	12·96
1/3 ".....	0·021	240 " (℥ss).....	15·53
1/2 ".....	0·032	5 drams (℥v).....	19·44
2/3 ".....	0·043	5 1/2 " (℥vss).....	21·39
3/4 ".....	0·048	6 " (℥vi).....	23·33
1 ".....	0·065	7 " (℥vii).....	27·22
2 grains.....	0·13	8 " (℥i).....	31·10
3 ".....	0·19	9 " (℥ix).....	34·99
4 ".....	0·26	10 " (℥x).....	38·88
5 ".....	0·32	12 " (℥iiss).....	46·66
6 ".....	0·39	14 " (℥xiv).....	54·43
7 ".....	0·45	16 " (℥ii).....	62·21
8 ".....	0·52	18 " (℥xviii).....	69·98
9 ".....	0·58	20 " (℥liiss).....	77·76
10 " (℥ss).....	0·65	3 ounces (℥iii).....	93·31
12 ".....	0·78	3 1/2 " (℥iiiss).....	108·86
14 ".....	0·91	4 " (℥iv).....	124·42
15 ".....	0·97	4 1/2 " (℥ivss).....	139·97
16 ".....	1·04	5 " (℥v).....	155·62
18 ".....	1·17	5 1/2 " (℥vss).....	171·07
20 " (℥i).....	1·30	6 " (℥vi).....	186·62
24 ".....	1·53	6 1/2 " (℥viss).....	202·18
30 " (℥ss).....	1·94	7 " (℥vii).....	217·73
36 ".....	2·33	8 " (℥viii).....	248·83
40 " (℥ii).....	2·59	9 " (℥ix).....	279·94
48 ".....	3·11	10 " (℥x).....	311·04
50 " (℥iiss).....	3·24	11 " (℥xi).....	342·14
60 " (℥i).....	3·89	12 " (℥xii or ℥i).....	373·25

In the second column of the following table are given approximate equivalents in grains for the metric quantities of the first column; the third column is in drams and apothecaries' ounces:

Conversion of Grams to Apothecaries' Weight.

Metric weight.	Apothecaries' weight.
0·001 gram.....	1/60 grain.....
0·002 ".....	1/30 ".....
0·003 ".....	1/20 ".....
0·004 ".....	1/15 ".....
0·005 ".....	1/12 ".....
0·006 ".....	1/10 ".....
0·008 ".....	1/8 ".....
0·01 ".....	1/6 ".....
0·02 ".....	1/3 ".....
0·03 ".....	1/2 ".....
0·04 ".....	2/3 ".....
0·06 ".....	1 ".....
0·08 ".....	1 1/3 grains.....
0·10 ".....	1 2/3 ".....
0·15 ".....	2 1/2 ".....
0·20 ".....	3 ".....
0·25 ".....	4 ".....
0·40 ".....	6 ".....
0·50 ".....	8 ".....
0·75 ".....	12 ".....
1·00 ".....	16 ".....
1·50 grams.....	23 ".....

Metric weight.		Apothecaries' weight.	
grams.		grains.	
2'00	grams	31	1/2 dram.
2'50	"	38	"
3	"	46	"
4	"	62	1 dram.
5	"	77	"
6	"	92	1 1/2 drams.
7	"	108	"
8	"	123	2 drams.
9	"	139	"
10	"	154	2 1/2 drams.
11	"	170	"
12	"	185	3 drams.
13	"	200	"
14	"	216	3 1/2 drams.
15	"	232	"
16	"	247	4 drams.
17	"	262	"
18	"	278	"
19	"	293	"
20	"	309	5 drams.
21	"	324	"
22	"	340	"
23	"	355	6 drams.
24	"	370	"
25	"	386	6 1/2 drams.
26	"	401	"
27	"	417	7 drams.
28	"	432	"
29	"	448	7 1/2 drams.
30	"	463	"
35	"	540	9 drams.
40	"	617	"
45	"	694	11 1/2 drams.
50	"	772	13 "
60	"	927	15 1/2 "
70	"	1,080	18 "
80	"	1,235	20 1/2 "
90	"	1,389	23 "
100	"	1,543	25 1/2 "
125	"	1,929	4 ounces.
150	"	2,315	38 1/2 drams.
175	"	2,701	45 "
200	"	3,086	50 "
225	"	3,472	58 "
250	"	3,858	8 ounces.
275	"	4,244	70 1/2 drams.
300	"	4,630	77 "
325	"	5,015	83 1/2 "
350	"	5,401	90 "
375	"	5,787	12 ounces.
400	"	6,173	13 "
425	"	6,559	13 1/2 "
450	"	6,944	14 1/2 "
475	"	7,330	15 "
500	"	7,716	16 "

In all the above rules and tables we may substitute respectively *cubic centimeter* for *gram*, *minim* for *grain*, *fluidram* for *dram*, and *fluid-ounce* for *ounce*, when the quantities refer to fluids. Incidentally it may be mentioned that Professor Oscar Oldberg proposed the word "fluigram" instead of cubic centimeter, as being simpler and showing the relation to the gram more readily. On the other hand, the term cubic centimeter conveys a clear idea of the actual volume of the liquid. The term "fluigram" has not been generally accepted.

Reference has frequently been made in journals to the improper use

of the decimal point in the metric prescriptions. We may avoid chances for error and misunderstanding by observing the following rule:

In prescriptions never use the decimal point except to designate the gram and its decimal fractions, as any other use is liable to lead to mistakes.

It is wrong, for instance, to write "0.2 centigram," because many readers accustomed to using the metric system, would be apt to overlook the word centigram and read the above as "0.2 gram," which it would be if the figures stood alone without any designation. The above should be written "0.002 gram," or "0.002 Gm.," or "2 milligrams."

It is perfectly proper to use whole numbers to express decigrams, centigrams, or milligrams, in which case the designating denomination should be written out in full. Fractions of these values should be expressed in prescriptions in common fractions, and not in decimal fractions; thus: " $\frac{1}{2}$ milligram," and not "0.5 milligram;" " $\frac{1}{4}$ centigram," or " $2\frac{1}{2}$ milligram," and not "0.25 centigram."

It is true that this use of the decimal point is not insisted upon by all writers on the metric system, but in the writer's opinion it should be so insisted upon in the interest of safety.

The pharmacist will find little difficulty in using the metric system, if he will provide himself with a set of metric weights and measures, which can be obtained for a very few dollars.

It is just as easy to place a gram-weight on one pan of a scale as it is to place a scruple-weight there, if you have it; or to fill a graduate to a line marked "25 cubic centimeters," as to fill it to a line marked "1 fluidounce."

A pharmacist might as well try to substitute shots of various sizes for his grain weights, calculating from the number of grains in the prescription how many shots will be equivalent, as to calculate how many grains, drams, or ounces are equivalent to a certain prescribed metric quantity. Not only does the pharmacist who tries to save the trifling amount necessary to properly qualify him to dispense metric prescriptions take numerous chances of error, but he loses much valuable time, and "time is money." Suppose that a pharmacist has only three metric prescriptions a week, and that each prescription averages four ingredients. He will have to calculate equivalents 624 times a year, and at the rate of one minute only to calculate and verify, he spends a full working day each year in this unprofitable occupation, and incurs 624 chances of an error which may ruin his business, and all to save less than \$5. If he has more prescriptions, say, two a day, he will devote full four days per year, and incur nearly 3,000 chances of error in the same time to save the same paltry sum.

Every pharmacist should have the necessary metric weights and

measures before he considers himself perfectly equipped for his profession.

“PARTS” IN FORMULAS.

“Parts” in the Pharmacopœia means the proportion to be used of the different ingredients mentioned in the formula. When any one is accustomed to the use of parts he will find them much easier for calculating the quantities required of each ingredient to make a certain total quantity of product. An example will make this clear:

The formula for *pulvis glycyrrhizæ compositus* is as follows:

Take of	
Senna, No. 60 powder	18 parts.
Glycyrrhiza, No. 60 powder.....	16 parts.
Fennel, No. 60 powder	8 parts.
Washed sulphur	8 parts.
Sugar, fine powder	50 parts.
To make	100 parts.

Mix thoroughly.

All “parts” are by weight, and we may assume each part to mean any definite quantity that we desire. If we assume each part to be 1 dram, then we take of the different ingredients, 18, 16, 8, 8, and 50 drams respectively; if we assume each part to be 1 grain, 1 ounce, or 1 pound, we take 18, 16, 8, 8, and 50 grains, ounces, or pounds respectively, as the case may be. Whatever weight we assume a part to be, we take 18, 16, 8, 8, and 50 times as much of each ingredient, according to its proportion, and the total will, of course, weigh just 100 times as much as the single part.

If we want to make a definite quantity, say 1 pound, of the above preparation, we divide the total weight of 1 pound by 100 to ascertain the weight of 1 part. One pound is 7,000 grains, which, divided by 100, will fix each part at 70 grains. Multiplying 70 grains by 18, 16, 8, 8, and 50 respectively, we have our formula as follows:

Take of	
Senna, No. 60 powder.....	1,260 grs.
Glycyrrhiza, No. 60 powder.....	1,120 grs.
Fennel, No. 60 powder.	560 grs.
Washed sulphur.....	560 grs.
Sugar, fine powder.....	3,500 grs.
Total	7,000 grs.

We verify our calculation by adding, when we see that the total is 7,000 grains, or 1 pound.

Incidentally these formulæ have the advantage of showing the percentage of any ingredient at a glance, at least in those formulæ in which the total product is either 100 or 1,000, and it is easily calculated when it is 200, or any other number divisible by 100. In the

preparation used as an example we have 18 per cent senna, 16 per cent glycyrrhiza, 8 per cent fennel, etc.

It will be observed that it is much easier to use the formulæ of the Pharmacopœia with metric weights, and the metric system is, therefore, rapidly coming into use.

Or the pharmacist may obtain a set of Troemner's weights, ranging from 1,000 grains down—1,000, 500, 200, 100, 50, 20, 10, 5, 2, 1, and fractions. By having in addition a lot of 1,000-grain weights, which each may cast for himself in solder metal, we can work much better and avoid the useless task of reducing the quantities in the above formula into pounds, ounces, drams, and grains, as we would have to do if we only had these weights.

In using "parts," we must remember that they are always by weight, whether the material is solid or liquid, unless the contrary is especially mentioned.

A formula may be written in "parts by measure," or "parts by volume," when all ingredients are liquid.

"PER CENT" FORMULÆ.

Quite frequently a pharmacist is called upon to dispense "per cent" solutions or preparations; for instance, 4-per-cent solution of cocaine, 2-per-cent solution of corrosive sublimate, etc.

The term "*per cent*," or "*percentum*," means "per hundred," and a 2-per-cent solution is, therefore, a solution, 100 parts of which contains 2 parts of the proper ingredient.

These formulæ are compounded by weight.

Suppose we have a call for 1 pint of 5-per-cent solution of carbolic acid in water. This is often written in the form of "proportions" in mathematics, thus:

R—Solutionis acidi carbolici, 5:100, Oj.
Signa: For external use.

Or it may be written:

R—Solutionis acidi carbolici, 5 per cent, Oj.
Signa: For external use.

When no solvent is mentioned, water is understood.

To prepare this, we first find the value of 1 per cent of a pint. One pint of water, at ordinary temperatures, weighs, in round numbers, 7,300 grains. The $\frac{1}{100}$ part of 7,300 grains equals 73 grains, and 5 per cent is five times 73 grains, or 365 grains. Tare the bottle, and weigh into it 365 grains of carbolic acid, and then add enough water to make the total weight 7,300 grains.

It is especially in calculating "percentage" preparations that we will find the metric system exceedingly convenient.

To compound, for example:

R—Solutionis hydrargyri bichloridi, 2%, 1 liter.
M. S.: For external use.

We figure thus: One liter equals 1,000 cubic centimeters, or weighs 1,000 grams, of which 10 grams is 1 per cent and 2 per cent is, therefore, 20 grams. We take, therefore, 20 grams of bichloride of mercury and the balance (980 grams) of water to make the total of 1,000 grams of solution. It is true that this will not be accurately 1 liter, as we ignore the fact that 20 grams of the bichloride do not occupy the volume of 20 cubic centimeters when in solution, but it is accurate enough for practical purposes.

It would be better to prescribe such solutions by weight rather than by measure. When all ingredients are liquids, they are sometimes prescribed "*by volume*," but "*by weight*" is always understood when the contrary is not distinctly specified. When *exact* quantities by volume must be made, the pharmacist's knowledge of mathematics should enable him to make allowance for differences in specific gravities, or he may make a little more of the solution than is prescribed, and then measure off the exact quantity. This is also necessary when large quantities of salts are prescribed in solution, as, for instance, 50-per-cent solutions of epsom salts, etc.

FORMULÆ BY PROPORTIONS.

Often these solutions, etc., are prescribed by proportion instead of by per cent, thus:

Solutio potassii chloratis, 1:16.

This means that $\frac{1}{16}$ is to be chlorate of potassium and $\frac{15}{16}$ water. The methods of calculating are, of course, the same as in per cent preparations.

APPROXIMATE MEASURES.

It is customary to administer liquid medicines to the patient in certain domestic measures, which, however, are not exact, but only approximate equivalents of the liquid measures employed in compounding and dispensing.

The following table includes the most useful of these approximate measures. In the first column the domestic name of the measure is given; in the second column, the equivalents in apothecaries' liquid measure; and in the third column, the equivalents in metric terms

It will be noticed that the second and third columns do not always correspond, some of the metric terms being more than those of apothecaries' liquid measure. This is owing to the fact that the teaspoon-

ful is more nearly eighty minims than sixty minims, or one fluidram, and so with the other approximate measures. The metric equivalents are, therefore, more nearly correct than the others.

Table of Approximate Measures.

A teacupful	= 4	fluidounces = 150 cubic centimeters.
A wineglassful	= 2	fluidounces = 60 cubic centimeters.
A tablespoonful	= $\frac{1}{2}$	fluidounce = 20 cubic centimeters.
A dessertspoonful	= 2	fluidrams = 10 cubic centimeters.
A teaspoonful	= 1	fluidram = 5 cubic centimeters.

On account of the inaccuracy of the spoons in general use, the approximate measures should be discarded altogether, and accurate medicine glasses or graduated spoons be used instead. These medicine glasses may be had of various forms and definitely graduated so that the physician can have the medicine as accurately dosed out to the patient as it is measured off by the pharmacist when compounding, and the patient will, therefore, get exactly the dose which was intended for him. When a spoonful is ordered to be taken the patient seldom gets the full dose intended for him, because the attendant will not quite fill the spoon for fear of spilling the medicine over the bedclothes. This is especially the case when the patient is a child, because the latter will often struggle desperately to avoid taking the medicine. If no medicine glass is in the house, and the spoon must be used as a measure, the attendant should be instructed to hold the spoon over a wine-glass, fill it to the brim, and then pour the medicine into the wine-glass, from which it may be given to the patient without risk of spilling.

The "drop" (*gutta, æ, f.*) is occasionally used as an approximate measure, but is so uncertain and variable in size that it should be discarded as much as possible. It may vary in size from $\frac{1}{3}$ to $1\frac{1}{2}$ minims, depending on the viscosity, or fluidity, of the liquid and the shape of the lip from which it is dropped; so that not only drops of different liquids have different sizes, but also drops of the same liquid vary according to circumstances.

The drop falling from the thin lip of some vial will be much smaller than the drop of the same liquid from the thick lips of a shelf-bottle.

For instance:

1 fluidram of alcohol	= 118—143	drops.
1 fluidram of water	= 45—64	drops.
1 fluidram of ether	= 150—200	drops.
1 fluidram of creasote	= 90—120	drops.
1 fluidram of glycerin	= 53—135	drops.
1 fluidram of chloroform	= 180—276	drops.
1 fluidram of tincture of chloride of iron	= 106—151	drops.
1 fluidram of tincture of opium	= 106—147	drops.
1 fluidram of croton oil	= 70—92	drops.

"Drop-machines" are made and sold, but they do not offer much

advantage, except that of convenience, for the size of the drop varies as much when dropped from these "machines" as when dropped from any other vessels.

The viscosity of a liquid has, of course, a great influence on the size of the drop, and the viscid mucilage or oil will yield larger drops than the less cohesive alcohol, chloroform, or ether. The above table serves to show, however, to what extent drops of the same preparation may vary. The drop should, therefore, not be used in a prescription except when the quantity desired is so small or so viscid that it can not be measured in the minim measure; as, croton oil, creasote, or some of the volatile oils.

The spoon (*cochlear, aris*, n., or *cochleare, is*, n., from *cochlea*, *æ*, f., a shell, a snail-shell) varies in size, and compound words are used in English to express the various sizes, while adjectives are used in Latin for the same purpose.

The teaspoon (*cochleare parvum*, small spoon) may be made of pewter, as used among the poor, when it often holds less than 60 minims. Silver and silver-plated teaspoons contain more nearly 80 minims. By careful pouring the teaspoon may be heaped full so as to contain more than 2 fluidrams.

The dessertspoon (*cochleare medium*) is rarely employed, and by the poor is generally designated as a "child's spoon" (*Kinder-læffel*, G.).

The tablespoon (*cochleare magnum*, large spoon) also varies in size with the material from which it is made. The pewter and Britannia ware spoons are thick and hold less than the silver or plated spoons.

If, therefore, spoons are to be used in administering the medicine the physician should ask to see the kind of spoons in the house, so that he may adjust his prescription accordingly.

Solids are sometimes dispensed by approximate measure. "A handful" (*manipulus, i*, m.) varies with the substance used, thus:

A handful of barley seed	=	80	grams.
“ flaxseed	=	50	“
“ flax meal	=	150	“

The "pinch," or as much as can be held in a grasp of the thumb and first two fingers, is also used. For example, a pinch of chamomile equals 2 grams.

Spoons are sometimes used to measure dry powders, and their values for this purpose we will state hereafter under the heading of "Powders."

PART III.

LANGUAGE.

ADVANTAGE OF LATIN LANGUAGE.

The Latin language is so generally employed all over the world for prescription writing, that it is very desirable that every pharmacist and physician should have at least an elementary knowledge of this language, and it is to be hoped that the time is not far in the future when such knowledge will be a fundamental requirement for admission to apprenticeship in a drug store or a physician's office.

The question, whether Latin should be used in prescriptions and in pharmacy, scarcely admits of debate, although some have argued that the vernacular languages would be preferable, because Latin is not generally understood.

But there are various reasons why Latin is preferable. English or vernacular names vary in different parts of the same country; the same English names are applied to different drugs in the same neighborhoods; vernacular names are unintelligible to foreigners who have settled among us; an English prescription written in one part of the country may be unintelligible in another part of the country, and is certain to be so in foreign countries; then, too, the patient can see and understand the English prescription, and it would arouse all his ignorant prejudices, and the physician would be needlessly hampered in the treatment of disease by the foolish notions of his patient. Lastly, but not least, the public would soon know not only the nature of the ingredients of a prescription, but also their intrinsic values, and would, therefore, refuse to pay more than commercial profits for medical treatment or medicines, and proper remuneration for professional services and responsibilities would cease.

There is still another reason to be urged against the abolition of the Latin language as the language of medicine and pharmacy, and that is that it would be lowering these sciences to the present unsatisfactory status of professional education and preliminary preparation, instead of elevating the professions to the higher level of education, as required in European countries. The humiliating confession that but a small proportion of our physicians and pharmacists know anything about Latin, should urge us to use all our influence to better this state of affairs, rather than lead us to join the ranks of those who try to do

without any scientific preliminary training. A universal language of science is a necessity, and, as Latin is a dead language, fixed in its rules, and not subjected to the changes necessarily incurred by living languages to accommodate themselves to new conditions of living, and especially as it is understood more or less perfectly by the educated in all countries, this is the best language for the nomenclatures of the sciences and arts. Being the source from which so many of our English words were derived, it is also a very simple and easy language to learn, and, as was remarked before, every one who intends to study medicine or pharmacy should study Latin as an indispensable preliminary. The ignorance of Latin often shown in the prescriptions in some of the works of American writers on medical subjects, renders American medical education a by-word among the nations, and makes each earnest friend of our country and our profession long for the day when the real worth of our physicians will no longer be hidden under the bushel measure of philological ignorance.

Familiarity with the nomenclature of our drugs and chemicals, and the construction of the names of galenical preparations in Latin, and a knowledge of at least the declensions, is necessary to be able properly to read a prescription. It is true, a prescription may be written correctly by abbreviating the names of its ingredients according to certain simple rules not necessarily requiring a knowledge of Latin, but requiring a memorizing of the official names of drugs and preparations. Or the physician may use these names in his prescriptions without modification on account of case, when his prescriptions will perhaps not be grammatically correct, but will certainly be intelligible anywhere.

GRAMMATICAL CONSTRUCTION OF PRESCRIPTIONS.

In these pages it will be impossible to give any extended instruction in Latin, but some of the elementary rules regarding the grammatical construction of the prescription may not be out of place.

Let us consider the following:

R—Magnesii sulphatis, ʒj.
D. S.: Take at once.

Cr, literally translated into English:

Take
Of magnesia's sulphate, 1 ounce.
Let it be given with the signature: Take at once.

℞ (abbreviation for *recipe*) is the imperative mood of the active verb *recipio*, *cepi*, *ceptum*, 3, to take. It means "take," and its object is placed in the accusative case in Latin, which is similar to the object-

ive case in English. "Take" what? "Take *one ounce*;" ℥j is a sign of quantity, and in writing can not be altered according to case, but in reading is pronounced *unciam unam*, or in the accusative following *recipe*.

The quantities being generally written in signs, which are, of course, indeclinable, they offer little difficulty in writing, even if the writer is totally ignorant of Latin.

"Take 1 ounce"—of what? *of sulphate*. This is written in Latin in the genitive case, which resembles the English possessive case. In Latin the construction would be "take the sulphate's 1 ounce."

But there are many sulphates of various substances, and we must specify which of these sulphates we want. In the above prescription the sulphate *of magnesia*, or "*magnesia's sulphate*" is ordered. Magnesia, therefore, is also placed in the genitive (English, possessive) case. But this genitive was already necessary in the official name, and, therefore, the word *magnesi* of the official name requires no change by being used in a prescription.

We see from the above that the prescription is the imperative "take," followed by the quantity, or object, in the accusative and the name of the drug in the genitive case. If the prescription contains two or more ingredients, the construction is, of course, the same for each.

Then follow one or more imperatives or subjunctives, directing what shall be done with these ingredients; in this case, "*Detur (cum, understood, or rather implied in the ablative) signatura*" (*let it be given, with the signature, or labeled*), which instructs the pharmacist to place a label containing the words "take at once" on the package and then give it to the patient.

When no quantity is mentioned in the prescription, the name of the ingredient or drug itself must be placed in the accusative case, as in the following prescription:

R—*Pilulas catharticas V.*

Or, in English:

Take five cathartic pills.

Here we have a numeral adjective, which, being written in character instead of in words, is, of course, really a sign, and is not altered according to case; and another adjective, "*catharticas*," which is declinable and must be made to agree with its noun,

ADJECTIVES.

In names with an adjective qualifying a noun the adjective is placed in the same gender, number, and case as the noun to which it belongs.

In the above prescription both the noun *pilulas* (pills) and the adjective *catharticas* (cathartic) are feminine gender, plural number, and accusative case. The numeral adjective *quinque* (five) is indeclinable.

In *Pulvis ipecacuanhæ compositus* the adjective *compositus* (qualifying *pulvis*) must be declined in the same manner as *pulvis*, while *ipecacuanhæ* is a genitive, which remains as it is, no matter how the name of the preparation may be employed.

In the name *Oleum menthæ piperitæ* the adjective does not modify the noun in the nominative, but the noun which is in the genitive case. It is not a peppery oil of mint, but an oil of peppery mint (peppermint), and *piperitæ*, therefore, is feminine, singular, genitive, agreeing with *menthæ*.

PREPOSITIONS, ADVERBS, AND CONJUNCTIONS.

If any word follows a preposition, it must be placed in the case governed by that preposition. Only three prepositions—*ad*, *cum*, and *in*—are employed in prescriptions, and the cases governed by them are easily remembered.

Ad (to) is followed by the accusative. Its use is explained further on.

Cum (with) governs, or is followed by, the ablative. The Latin ablative is the same as the English objective following *with*, *from*, *by*, or *in*. The Latin word in the ablative includes the preposition, which is sometimes written, sometimes merely understood. *Cum* is occasionally used in names of preparations, as *hydrargyrum cum creta*. When such a name occurs in prescriptions, only the first word, the nominative, needs to be altered to the genitive, thus: \mathfrak{R} —Hydrargyri cum creta, gr. X.

In (in or into) is followed by the accusative (equal to the objective case following a transitive verb or a preposition) when it implies a change from one form or condition *into* another, thus: *Divide in pilulas XII* (divide into 12 pills); but it is followed by the ablative when it implies a state of rest or position, as when we write: "*Detur in vitro nigro*" (let it be given in a black vial—literally, in a black glass).

Ana ($\alpha'v\alpha'$, of each) is an adverb used in prescriptions, after the last of two or more successive ingredients of which equal quantities are ordered. It means "of each," or "of each so much." It is usually written as a sign, $\bar{a}\bar{a}$, and is followed by the sign for the quantity.

Et (and) is a conjunction. It is often written, and is still more often to be understood when reading the prescription, as it is very frequently omitted in the subscriptions or directions to the druggist.

DECLENSIONS.

In Latin there are six cases—nominative, genitive, dative, accusative, vocative, and ablative; of these the dative and vocative are not used in prescriptions. The nominative is practically the same in both languages; the genitive resembles the possessive case; the accusative is similar to the objective following a transitive verb; and the ablative is similar to the English objective following the prepositions *with*, *from*, *in*, or *by*. In Latin the case is indicated by a change in the termination of the word—by “case endings;” for instance, we say *rosa* (nominative, *the rose*) and *rosæ* (genitive, *the rose’s*, or *of the rose*).

As the great secret of elegant and correct prescription writing depends on a knowledge of the case endings of the words of the official and unofficial pharmaceutical names, the reader will no doubt find it of interest to have his memory refreshed if he has already studied Latin, or to learn the declensions now if he has never done so before.

A noun is often modified in form by the case in which it must be placed, and it is, therefore, of importance to understand what is meant by “case.” It has been stated by writers on this subject that *case* is a word which signifies *condition* or *relation*. The relation which a noun bears to the other words of a sentence determines its case, and, as the case is expressed by the form of the word, this relation determines the peculiar modification, if any, that is necessary to show the case.

When a noun or pronoun is simply named, or is named as doing something—that is, as the subject of a verb—it is said to be in the *nominative* case (from the Latin adjective, *nominativus*, *a*, *um*, appertaining to naming; in turn, from *nomen*, *inis*, *n.*, name). Thus, when we say “John,” John is in the nominative case, because merely named; or, if we say, “John studies,” John is also in the nominative case, because John is named as the subject of a verb.

Whenever a noun or pronoun is named as the possessor of something, it is placed in the *possessive* case (from *possessus*, *us*, *m.*, or *possessio*, *onis*, *f.*, possession). When we say “John’s hat,” the name of John is modified by the addition of an apostrophe and an “s” to imply possession on the part of John. In English, possession is often expressed by the name of a noun in the objective case following the preposition *of*, thus: *The hat of John* means the same as *John’s hat*. And this method of expression is most commonly employed in translating from the Latin *genitive* case (equivalent to the English possessive), and *ferri citras* is, therefore, translated to *citrate of iron* rather than to *iron’s citrate*, which latter would be the literal translation.

When a noun or pronoun is mentioned as affected by the action of some one or something else, either directly or indirectly—or, in other words, when it is the object of an action—it is said to be in the *objective* case (from *objectum*, the supine of *objicio*, *jeci*, *jectum*, *3*, to lay

before, to expose to). A noun or pronoun following a transitive verb is in the objective case, as when we say, "the patient swallows pills," or when we say in the prescription, "take 1 ounce," etc. In the first example the word "pills" is in the objective case; in the second, the word "ounce."

Or, a noun may be in the objective case when it follows a preposition—*of, with, in, by,* etc. In the sentence, "the medicine is in the bottle," the word bottle is in the objective case, following "in."

The relation of the words to each other and to the verbs of the sentences determines the cases, and, as these circumstances vary, the cases are altered. "Circumstances alter cases" was not originally intended to be used in this connection, but it applies quite forcibly nevertheless. The whole subject of cases is made very plain in French's "A Word to the Wise," from which the following is an extract: "I will now tell you how you may always distinguish the three cases. Read the sentence attentively, and understand accurately what the nouns are represented as doing. If any person or thing be represented as *performing an action*, that person or thing is a noun in the nominative case. If any person or thing be represented as *possessing something*, that person or thing is a noun in the possessive case. And if any person or thing be represented as neither performing nor possessing, it is a noun in the objective, whether directly or indirectly affected by the action of the nominative; because, as we have in English but *three* cases which contain the substance of the *six Latin* cases, *whatever is neither nominative nor possessive must be objective.*"

In Latin there are six cases: The *nominative* (equivalent to the English case of the same name); the *genitive* (equivalent to the English possessive case); the *dative* (equivalent to the English objective following the preposition "to," as in the sentence, "it is given to John"), which is rarely or never used in prescriptions; the *accusative* (equivalent to the English objective after a transitive verb, or such prepositions as "to" or "into," etc.); the *vocative* (used in appellation, as when we say, "Hello, John"); and the *ablative* (equivalent to the English objective following such prepositions as "from," "with," "in," or "by").

Of these six cases the *dative* and *vocative* may be ignored for our purposes because they are not used in prescription writing.

As pronouns are not used in prescriptions except as "understood" in the imperatives *recipe* (take, or take thou), *misce* (mix, or mix thou), etc., we need not speak about them, and can restrict our remarks for the present to nouns. With very few exceptions Latin nouns alter their forms according to the case in which they stand, and this alteration consists in a change of the last syllable or termination. Nouns which do not undergo such changes are said to be indeclinable, which

is generally expressed in dictionaries by the abbreviation "indecl." after the word, thus: "*catechu*, indecl."

There are five declensions in Latin, depending on the change of the nominative to the genitive—that is, therefore, according to the formation of the genitive.

The genitive endings of the different declensions are as follows:

First declension.....	æ (often printed æ).
Second declension.....	i .
Third declension.....	is .
Fourth declension.....	us .
Fifth declension.....	ei .

By dropping the ending from the genitive singular the stem of the word is found, and the other cases are then obtained by adding the respective case endings.

First Declension.

This declension comprises all pharmacopœial names or nouns ending in *a*, except *physostigma* and *coca*. They are feminine gender, and the cases are formed in the singular by changing the final *a* to *æ* in the genitive, *am* in the accusative, while the ablative is like the nominative, ending in *a*. In the plural the nominative is *æ*; the genitive, *arum*; the accusative, *as*; and the ablative, *is*.

Or, placing this in tabular form, the endings of the first declension are thus:

	Singular.	Plural.
Nominative.....	a.	æ.
Genitive.....	æ.	arum.
Accusative.....	am.	as.
Ablative.....	a.	is.

The plural is rarely employed in prescriptions, our Pharmacopœia using the singular in the nomenclature of drugs and preparations. European works, however, frequently use the plural, and it is, therefore, thought advantageous to give the endings for the plural also.

Declining the word *gutta*, we have the following forms:

	Singular.	
Nominative.....	<i>gutta</i> ,	a drop.
Genitive.....	<i>guttæ</i> ,	of a drop.
Accusative.....	<i>guttam</i> ,	a drop.
Ablative.....	<i>gutta</i> ,	with, from, or by a drop.
	Plural.	
Nominative.....	<i>guttæ</i> ,	drops.
Genitive.....	<i>guttarum</i> ,	of drops.
Accusative.....	<i>guttas</i> ,	drops.
Ablative.....	<i>guttis</i> ,	with, from, or by drops.

Some words, as used in pharmacy, have no plural, as, for instance, *acacia*, which is only used in the singular number. It is true, however, that this same word, when applied to the acacias or the trees from which the drug is derived is used in the plural form.

The student who has never studied Latin, but who wishes to get a rudimentary knowledge of the subject of Latin case modifications, will find it profitable to decline a few nouns in the above manner, ignoring the plural, if he prefers, as he will make little use of it in prescription writing. Let him take for this purpose a few such words as *achillea*, *althæa*, *ammonia*, *amygdala*, *aqua*, *bacca*, *brayera*, *ergota*, *cinchona*, *fluidrachma*, *fluiduncia*, etc., not forgetting that *coca* and *physostigma* are exceptional words which are not declined according to the first declension.

There are some Latin words which are declined according to the first declension, which are from Greek nouns, and which end in *e*, and of which the case endings are irregular. They are declined:

Singular.

Nominative.....	e.
Genitive	es.
Accusative.....	en.
Ablative	e.

The only words used in prescriptions which have this form are *aloë*, *mastiche*, and *statice*, none of which are used in the plural, for which reason we omit the latter; besides the plural is regular, and, therefore, needs not to be repeated.

As already stated, adjectives must agree with their nouns in number, gender, and person. All nouns of the first declension which are used in prescriptions, end in *a* or *e*, and are feminine. The feminine form of adjectives of the first and second declensions end in *a*, and such adjectives are declined like *gutta*, above. The masculine and neuter forms are declined according to the second declension. The three forms of these adjectives are printed in dictionaries according to this manner: *Aromaticus*, *a*, *um*, adj., aromatic—of which the first is always masculine, the second feminine, and the last the neuter form.

Second Declension.

Pharmaceutical nouns ending in *us* are declined according to the second declension, and are of masculine gender. A few words, however, ending in *us* are exceptions to this rule and are declined according to the third or fourth declensions. Nouns ending in *os* are also declined according to this declension, and may be masculine or feminine. Nouns ending in *um* or *on* (not increasing in the genitive) are

also declined according to this declension and are of neuter gender. All of them form the genitive by changing the nominative ending to *i*.

The case endings of the above forms of words of the second declension are as follows:

Singular.				
Nominative	us.	os.	um.	on.
Genitive	i.	i.	i.	i.
Accusative	um.	on.	um.	on.
Ablative	o.	o.	o.	o.
Plural.				
Nominative	i.	i.	a.	a.
Genitive	orum.	orum.	orum.	orum.
Accusative . . . . .	.os.	os.	a.	a.
Ablative	is.	is.	is.	is.

Words ending in *us* or *um* are the common pure Latin masculine and neuter forms of the nouns of the second declension. The nouns ending in *os* or *on* are of Greek origin.

Nouns ending in the common form of *us* are declined as follows:

Singular.	
Nominative	<i>syrupus</i> , syrup.
Genitive	<i>syrupi</i> , of syrup.
Accusative	<i>syrupum</i> , syrup.
Ablative	<i>syrupo</i> , with, from, or by syrup.
Plural.	
Nominative	<i>syrupi</i> , syrups.
Genitive	<i>syruporum</i> , of syrups.
Accusative	<i>syrupos</i> , syrups.
Ablative	<i>syrupis</i> , with, from, or by syrups.

The student may practice by declining in the same manner such words as *calamus*, *coccus*, *crocus*, *eucalyptus*, *ficus*, *humulus*, *moschus*, *ricinus*, *succus*, *vitellus*, etc.

All pharmaceutical nouns and adjectives ending in *us* are declined as above except *rhus*, n., and *fortius*, adj., which are of the third declension; *cornus*, *haustus*, *potus*, *fructus*, *quercus*, and *spiritus*, which are of the fourth declension (which see), and *unus*, adj., the genitive of which ends in *ius*.

It must be remembered also that the following few words, *alnus*, *juniperus*, *prunus*, *sambucus*, and *ulmus*, although ending in *us* and declined like the common masculine nouns of the second declension, are of the feminine gender and the adjectives must, therefore, have the feminine form in order to agree with their nouns, thus: *Prunus virginiana*, *ulmus fulva*, etc.

Nouns of Greek origin ending in *os* are generally masculine, and the cases are formed like those of nouns ending in *us*, except that the accusative singular ends in *on*. *Cissampelos*, f., *diospyros*, f., and *prinos*, m., are nouns declined thus:

	Singular.	Plural.
Nominative	diospyros.	diospyri.
Genitive	diospyri.	diospyrorum.
Accusative	diospyron.	diospyros.
Ablative.....	diospyro.	diospyris.

Regular Latin neuter nouns of the second declension end in *um*, and are declined as follows:

	Singular.	Plural.
Nominative	acidum.	acida.
Genitive	acidi.	acidorum.
Accusative	acidum.	acida.
Ablative	acido.	acidis.

The student will do well to decline *absinthium*, *aconitum*, *amyllum*, *argentum*, *balsamum*, *calcium*, *capsicum*, *chloroformum*, *collodium*, *decoctum*, *emplastrum*, *extractum*, *infusum*, *linum*, *oleum*, *rheum*, *sodium*, *vinum*, *zincum*, and other nouns ending in *um*, in the same manner as *acidum*.

The only exception to the rule that nouns or adjectives ending in *um*, which are used in prescriptions, are declined as above, is the neuter form of the adjective *unus*, *a*, *um*, which has the ending *ius* in the genitive.

Nouns of Greek origin ending in *on* are neuter, and are declined in the same manner, except that the nominative and accusative singular end in *on*, instead of *um*.

	Singular.	Plural.
Nominative.....	erythroxyton.	erythroxyta.
Genitive	erythroxyti.	erythroxytorum.
Accusative	erythroxyton.	erythroxyta.
Ablative.....	erythroxyto.	erythroxytis.

Hæmatoxyton, *liriodendron*, *pyroxyton*, and *toxicodendron* are declined in the same way.

Erigeron, however, is an exception, being declined according to the third declension, and forming its genitive thus: *Erigerontis*.

Third Declension.

The third declension is somewhat peculiar in construction, and many words with very unlike endings are declined according to it.

With very few exceptions, already mentioned or yet to be mentioned,

all nouns not ending in *a*, *us*, or *um* are of the third declension. Nouns in this declension may end in **a**, **e**, **i**, **o**, **y**, **c**, **l**, **n**, **r**, **s**, **t**, or **x**, and may be masculine, feminine, or neuter.

On account of the variety and irregularity of its case endings this declension is the most difficult to learn, but it may be remembered that a large number of nouns of this declension end in *as*, which is changed to *atis* in the genitive, thus: *acetas*, genitive *acetatis*; the exceptions being *asclepias*, genitive *asclepiadis*, and *mas*, genitive *maris*.

Nouns ending in *go* are feminine, and the genitive ends in *ginis*. Nouns ending in *io*, formed from a verb, are feminine, and the genitive changes the *o* to *onis*. Nouns ending in *ma* are neuter, and have *a* changed to *atis* in the genitive.

The nouns of this declension may be divided into two classes: those having a case ending in the nominative and those having none. In the first class the stem of the word is contained in the nominative, together with the ending which ends in *e*, *s*, or *x*; in the second class the nominative singular is either the same as the stem, as in *chloral*, genitive *chloralis*, or it is formed by dropping or changing one or more letters of the stem.

It will be remembered that the stem of a declinable word is ascertained by dropping its genitive ending. (See page 79.) In the word *lotio*, genitive *lotionis*, the stem of the word is *lotion*, and the nominative is formed by dropping the final *n* of the stem. In the word *radix*, genitive *radicis*, the stem of the word is *radic*, and the nominative is formed by changing *c* to *x*. In the word *cortex*, genitive *corticis*, the stem is *cortic*, and the nominative is formed by changing the *c* to *x*, and the vowel *i* to *e*.

The other cases are formed by dropping the *is* of the genitive and placing the proper endings instead.

The case endings of the third declension are as follows:

	Singular.	
	Male and Female.	Neuter.
Nominative.....	s (es, is), —.	e , —.
Genitive.....	is .	is .
Accusative.....	em (im).	like nominative.
Ablative.....	e (i).	e (i).
	Plural.	
Nominative.....	es .	a (ia).
Genitive....	um (ium).	um (ium).
Accusative.....	es .	a (ia).
Ablative.....	ibus .	ibus .

The dash in the nominative singular means that the case ending is wanting.

In order to decline words of the third declension properly we must know the nominative and genitive singular and the gender in order to choose the proper set of case endings. In dictionaries these words are, therefore, in the following form: *Mucilago, inis, f.*, mucilage.

It would lead us altogether too far to explain when the endings *um* or *ium* should be used in the genitive plural, or when *a* or *ia* are proper in the nominative or accusative, plural, neuter; nor is it necessary, as it is not customary in this country to use the plural in prescriptions, and the above table of the case endings will enable the student to recognize the cases if he should come across them in his reading.

The ablative singular also is very rarely used in prescriptions, but it may be remembered that the ending *e* is used in most nouns; *i* is used in neuters ending in *e*, *al*, and *ar*; in adjectives in *er* or *is* when used as nouns; in nouns with *im* in the accusative, etc. This can not be fully explained except by a thorough consideration of the rules of the Latin language, which is beyond the scope of our present writing.

No one characteristic example of this declension can be given, as it is too irregular.

Fourth Declension.

A few Latin words used in prescriptions are declined according to the fourth declension. They end in *us*, m., and *u*, n., and have *us* as the case ending of the genitive singular.

The following are the case endings of this declension.

	Singular.	
Nominative	us.	u.
Genitive	us.	us.
Accusative	um.	u.
Ablative	u.	u.
	Plural.	
Nominative	us.	ua.
Genitive	uum.	uum.
Accusative	us.	ua.
Ablative	ibus.	ibus.

Nouns of this declension ending in *us* are generally masculine; those ending in *u* are neuter. The word *fructus*, m., is thus declined:

	Singular.	Plural.
Nominative	fructus.	fructus.
Genitive	fructus.	fructuum.
Accusative	fructum.	fructus.
Ablative	fructu.	fructibus.

In the same manner the following may be declined: *Haustus, us, m.*, *potus, us, m.*, *spiritus, us, m.*, *quercus, us, f.*, and *cornus, us, f.* The

last word must not be confounded, however, with *cornu, us*, horn, used as the name of an almost obsolete drug: *cornu cervi*, or hart's horn.

Fifth Declension.

Only two words of this declension are used in prescriptions, namely, *dies, ei, m.*, or *f.*, day, which is sometimes used in signatures, thus: "*ter in die*," and *species, ei, f.*, a mixture of herbs for teas.

Singular. Plural.

Nominative	es.	es.
Genitive	ei.	erum.
Accusative.....	em.	es.
Ablative	e.	ebus.

Dies is declined thus, but *species*, according to some authors, has no genitive, dative, and ablative plural.

INDECLINABLE NOUNS.

Several nouns used in pharmacy and prescriptions are indeclinable. That is, the case endings for all cases are alike, and these words, therefore, remain unchanged, no matter what may be the case.

The following is a partial list of these words:

Alcohol,	Coca,	Kousso,
Amyl,	Curare,	Mais,
Azedarach,	Elemi,	Matico,
Buchu,	Jaborandi,	Sago,
Catechu,	Kino,	Sassafras.

Others are included in the list of words further on.

Indeclinable nouns are neuter, and the adjectives must agree by also being used in the neuter form.

Two of the above words are somewhat peculiar, however. *Alcohol*, *n.*, *indecl.*, is neuter, and is so used in the Pharmacopœia, for instance, in the title *alcohol dilutum*. But according to many good authorities, to the acceptance of whose views the writer confesses preference, *alcohol* is not indeclinable, but is *alcohol, olis, m.*, and the pharmacopœial title should, therefore, be *alcohol dilutus*.

When the Latin word for Indian corn or maize is spelled *mais* it is indeclinable and neuter, but when spelled *mays*, it is *mays, dis, f.*; that is, it is declinable according to the third declension, and is feminine. We may, therefore, say either *ustilago mais*, or *ustilago maydis*.

ADJECTIVES.

Adjectives are parts of speech used to qualify nouns, as, the *good* man, the *beautiful* woman. In English the adjective has one form only

no matter whether it applies to a masculine, feminine, or neuter noun, or in what case such noun may be; in other words, adjectives are indeclinable in English. In Latin, however, adjectives have different gender endings as well as different case endings, and must, therefore, be declined to agree with their nouns, as, for example, if we consider *alcohol* indeclinable and neuter, then the Latin title for diluted alcohol is *alcohol dilutum*, while if we consider it declinable it is masculine, and the adjective must have the masculine ending *us*, thus: *alcohol dilutus*.

Some adjectives have three forms, masculine, feminine, and neuter; of which the feminine form is declined according to the first, and the masculine and neuter according to the second declension.

All other adjectives are of the third declension.

Adjectives of First and Second Declensions.

All adjectives used in prescriptions which are declinable according to the first and second declensions, have the following endings in the nominative singular:

Masculine.	Feminine.	Neuter.
us.	a.	um.

In dictionaries it is customary to give the masculine form, followed by the feminine and neuter endings and the letters "adj.," thus: *Amarus, a, um, adj.*, bitter. These adjectives are declined regularly, like nouns of the corresponding declensions. Some irregular forms of adjectives of the second declension occur also, as, for example, those ending in *er*, etc., but as the writer can not remember any of these that are likely to occur in a prescription, it does not seem necessary to dwell on the method of declining them.

The only irregular adjective of the first and second declensions used in prescriptions, is *unus, a, um*, of which the genitive in all three genders is *unius*.

Adjectives of the Third Declension.

These are divided into three classes, according to the peculiarities of their endings in the nominative singular:

1. Those that have a different ending for each gender:

	Masculine.	Feminine.	Neuter.
Nominative.....	er.	is.	e.
As in <i>acer, acris, acre</i> , sharp.			

2. Those having the same ending for masculine and feminine, and another for neuter:

	Masculine.	Feminine.	Neuter.
Nominative.....	is.	is.	e.
As in <i>dulcis, dulce</i> , sweet.			

3. Adjectives with only one ending for all three genders. These endings generally have as a final letter *s* or *x*, as in *felix, icis*, happy; *fragrans, antis*, fragrant; *princeps, ipis*, first, most important, etc.; more rarely they end in *l* or *r*.

All adjectives of this declension are declined like nouns of the same declensions and of corresponding endings, with certain exceptions, prominent among which is that the ablative generally ends in *i*, instead of in *e* as is the rule with nouns.

Comparison of Adjectives.

In Latin as in English we may compare adjectives in three ways: first, by changing the endings; second, by joining with an adverb; and third, irregularly, by the use of different words.

In both languages, also, we have the three degrees, the *positive*, *comparative*, and *superlative*. Examples:

1. Plain, plainer, plainest.
2. Beautiful, more beautiful, most beautiful.
3. Good, better, best.

In Latin, adjectives are compared regularly by adding to the stem of the ordinary or positive form, which, as will be remembered, is obtained by dropping the genitive endings, the following endings:

	Masculine.	Feminine.	Neuter.
Comparative	ior.	ior.	ius.
Superlative	issimus.	issima.	issimum.

Thus: *Altus, a, um*, high; *altior, ius*, higher; *altissimus, a, um*, highest.

The following irregularities may be noted:

Adjectives ending in *er* add *rimus* in the superlative, as *acer*, sharp; *acerrimus*, sharpest. Also,

	Positive.	Comparative.	Superlative.
<i>Good</i>	bonus.	melior.	optimus.
<i>Bad</i>	malus.	pejor.	pessimus.
<i>Large</i>	magnus.	major.	maximus.
<i>Much</i>	multus.	plus.	plurimus.
<i>Small</i>	parvus.	minor.	minimus.

The formation of a comparative or superlative by aid of an adverb is not apt to occur in prescription writing.

NUMERAL ADJECTIVES.

The writing of numbers in prescriptions offers no difficulty to any one not a Latin scholar, as the ordinary Roman notation is used. All

numbers are expressed by one or a combination of two or more of the following letters: I, V, X, L, C, D, M. I means 1; V, 5; X, 10; L, 50; C, 100; D, 500; and M, 1,000. These should be written altogether as capital letters, but in prescriptions we find them much more frequently written as small letters, or, in print, as lower-case letters, and it is also customary to write the last I, when several are placed together, like a printed lower-case "j." The letters are combined thus:

I.....	1	VIII.....	8	LX.....	60
II.....	2	IX.....	9	XC.....	90
III.....	3	X.....	10	C.....	100
IV.....	4	XI.....	11	CC.....	200
V.....	5	XX.....	20	DC.....	600
VI.....	6	XL.....	40	M.....	1,000
VII.....	7	L.....	50	MDCCLXXXVI	1886

It will be noticed that four is written IV, the letter I (1) prefixed to V (5), meaning "one less than five." In the same manner nine is written IX, or "one less than ten;" forty, XL, or "ten less than fifty;" and ninety, XC, or "ten less than one hundred." Numbers are written by merely commencing with the largest at the left, then the next largest, and so on, according to value of the single letters, until the total is the number which we wish to express. In the example of the number of the year, above, this may be seen.

In reading prescriptions it is necessary to know the names of cardinal as well as ordinal numerals, which are found in the following columnus:

The cardinal numbers are read *one, two, three, etc.*; the ordinals, *first, second, third, etc.*

	Cardinals.	Ordinals.
1.....	I. unus, a, um.	primus.
2.....	II. duo, duæ, duo.	secundus.
3.....	III. tres, tria.	tertius.
4.....	IV. quatuor.	quartus.
5.....	V. quinque.	quintus.
6.....	VI. sex.	sextus.
7.....	VII. septem.	septimus.
8.....	VIII. octo.	octavus.
9.....	IX. novem.	nonus.
10.....	X. decem.	decimus.
11.....	XI. undecim.	undecimus.
12.....	XII. duodecim.	duodecimus.
13.....	XIII. tredecim.	tertius decimus.
14.....	XIV. quatuordecim.	quartus decimus.
15.....	XV. quindecim.	quintus decimus.

		Cardinals.	Ordinals.
16.....	XVI.	sexdecim.	sextus decimus.
17.....	XVII.	septendecim.	septimus decimus.
18.....	XVIII.	duodeviginti.	duodevicesimus.
19.....	XIX.	undeviginti.	undevicesimus.
20.....	XX.	viginti.	vicesimus.
21.....	XXI.	viginti unus.*	vicesimus primus.
22.....	XXII.	viginti duo.	vicesimus secundus.
30.....	XXX.	triginta.	tricesimus.
40.....	XL.	quadriginta.	quadragessimus.
50.....	L.	quinquaginta.	quingagesimus.
60.....	LX.	sexaginta.	sexagesimus.
70.....	LXX.	septuaginta.	septuagesimus.
80.....	LXXX.	octoginta.	octogesimus.
90.....	XC.	nonaginta.	nonagesimus.
100.....	C.	centum.	centesimus.
101.....	CI.	centum unus.	centesimus primus.
200.....	CC.	ducenti, æ, a.	ducentesimus
300.....	CCC.	trecenti.	trecentesimus.
400.....	CCCC.	quadrigenti.	quadringentesimus.
500.....	D.	quingenti.	quingentesimus.
600.....	DC.	sexcenti.	sexcentesimus.
700.....	DCC.	septingenti.	septingentesimus.
800.....	DCCC.	octingenti.	octingentesimus.
900.....	DCCCC.	nongenti	nongentesimus.
1,000.....	M.	mille.	millesimus.

All of the ordinals have all three gender endings — *us, a, um* — and are declined like all other adjectives of the first and second declensions.

Of the cardinal units, only *unus, duo, and tres* are declined. All tens and *centum* are indeclinable. The hundreds are declined as plurals of the first and second declensions, thus: *ducenti, æ, a*. *Mille* is also sometimes declined as a neuter of the third declension.

Unus, a, um; duo, æ, o; and tres, tria are declined as follows:

	Masculine.	Feminine.	Neuter.
Nominative	unus.	una.	unum.
Genitive	unius.	unius.	unius.
Accusative	unum.	unam.	unum.
Ablative.....	uno.	una.	uno.
Nominative	duo.	duae	duo
Genitive	duorum.	duarum.	duorum.
Accusative	duos or duo.	duas.	duo.
Ablative	duobus.	duabus.	duobus.

* Or, *unus et viginti*, etc.

	Masculine.	Feminine.	Neuter.
Nominative	tres.	tres.	tria.
Genitive	trium.	trium.	trium.
Accusative	tres.	tres.	tria.
Ablative	tribus.	tribus.	tribus.

Fractions can only be expressed in words, with the exception of "half," which is abbreviated to "ss" or " β ." The first of these signs is an English double "s," the second a German double "s;" both from the Latin adjective *semissis*, *e*, half. Other fractions are written by adding to the word *pars*, *tis*, *f.* (part), the ordinal numeral which expresses the fraction, as, *pars decima*, the tenth part; *pars vicesima quarta*, the twenty-fourth part. The word *pars* may either be expressed or understood.

In prescriptions it is customary to depart from the Latin and use Arabic numerals for all fractions less than one-half; "one-fifth of a grain" would, therefore, be written "gr. $\frac{1}{5}$," and not "*grani pars quinta*."

PARTICIPLES.

Participles are declined like adjectives. They give the meaning of a verb in the form of an adjective, thus: *Aqua bulliens*, boiling water; *bulliens* being a participial adjective from the active present participle of the verb *bullio*, *ivi*, *itum*, 4, to boil. These active present participles form adjectives of the third class of the third declension.

The active future and the passive perfect and future participles are also used as adjectives, and as they end in *us*, *a*, *um*, they are declined like adjectives of the first and second declensions. Of these forms the passive future participle is sometimes used in the subscription of a prescription, as when we say, "*fiat massa dividenda in pilulas XXXIV*;" let a mass, to be divided into 24 pills, be made.

LIST OF NOUNS AND ADJECTIVES.

For convenience of reference we append an alphabetical list of nouns and adjectives likely to occur in prescriptions. The list is necessarily incomplete, because there are many obsolete or obsolescent words, as well as some new ones not yet in general use, which may occasionally find their way into a prescription, that are not here enumerated. The following abbreviations following the words are used: The numbers refer to the declensions; "*m.*" means masculine; "*f.*" feminine; and "*n.*," neuter; "*adj.*" is adjective or participial adjective.

tive; "*indecl.*" designates indeclinable words. All words are nouns unless otherwise marked.

Words are regularly declined when they are designated only by a number following, and unless marked otherwise all followed by "1" are understood to be of the first declension, feminine; if marked "2," means of second declension, and masculine if ending in *us* or *os*, or neuter if ending in *um* or *on*, exceptions being marked by the letter indicating the gender. After adjectives ending in *us*, *a*, *um*, no number is given, as it is understood that these are declinable according to the first and second declensions. The English meaning is not given, as this list is not intended for dictionary purposes, but to ascertain the method of declining.

As the genitive singular is used so much more frequently than any other case, it may prove of use to call attention to the following recapitulations:

1. All words of this list ending in *a* and marked "1," form the genitive by changing the *a* to *æ*.

2. All words of this list ending in *us*, *os*, *um*, or *on* and marked "2," change the above endings to *i* in the genitive.

3. Adjectives and participial adjectives ending in *us*, *a*, or *um* form their genitives in a corresponding manner.

4. All other words of this list have the genitives stated, but it may be convenient to remember that usually words of the third declension ending in *as* change this to *atis* in the genitive; ending in *ma*, change *a* to *atis*; ending in *go*, change *o* to *inis*; and ending in *io*, change *o* to *onis*. The genitive singular of the third declension ends in *s* or *is*, and the nominative ending *is*, quite frequently, although by no means always, changes to *idis* in the genitive.

Some of the words in this list have the genitive formed in different ways, and in such cases, if both are more or less in use, both are given; the first one being, in the judgment of the writer, more commonly used. See, as examples: *Alcohol*, *anthemis*, *decoctum*, *elixir*, etc.

In some cases where a word has two forms, one of which is common while the other is quite uncommon, the latter is omitted, as in *hydrastis*, the genitive of which is generally *hydrastis*, although some authorities give it as *hydrastidis*. So also some words may be marked with one gender while some authorities occasionally give another gender, but it is believed that the list gives the best usage in these regards.

Reference List.

Abrus, 2.

Absinthium, 2.

Abstractum, 2.

Acacia, 1.

Acer, acris, acre, 3; *adj.*

Acetas, atis, 3, *m.*

- Acetatus, a, um; *adj.*
 Aceticus, a, um; *adj.*
 Acetum, 2.
 Achillea, 1.
 Acidum, 2.
 Aconitina, 1.
 Aconitum, 2.
 Actæa, 1.
 Adeps, ipis, 3, *m.*
 Adhæsivus, a, um; *adj.*
 Adiantum, 2.
 Æqualis, e, 3; *adj.*
 Ærugo, inis, 3.
 Æther, is, 3, *m.*
 Æthereus, a, um; *adj.*
 Agaricus, 2.
 Ailantus, 2, *f.*
 Albumen, inis, 3, *n.*
 Albus, a, um; *adj.*
 Alcohol, *indecl.*; *n.*; or
 Alcohol, olis, 3, *m.*
 Alcoholicus, a, um; *adj.*
 Aletris, idis, 3, *f.*
 Allium, 2.
 Alnus, 2, *f.*
 Aloë, ës, 1, *f.*
 Aloinum, 2.
 Alstonia, 1.
 Althæa, 1.
 Alumen, inis, 3, *n.*
 Aluminium, 2.
 Amarus, a, um; *adj.*
 Americanus, a, um; *adj.*
 Ammonia, 1.
 Ammoniacum, 2.
 Ammoniatus, a, um; *adj.*
 Ammonium, 2.
 Ampelopsis, is, 3, *f.*
 Amygdala, 1.
 Amyl, *indecl.*; *n.*
 Amylicus, a, um; *adj.*
 Amylum, 2.
 Angelica, 1.
 Angustura, 1.
 Animalis, e, 3; *adj.*
 Anisatus, a, um; *adj.*
 Anisum, 2.
 Anthemis, is, 3, *f.*; or
 Authemis, idis, 3, *f.*
 Antidotum, 2.
 Antimonium, 2.
 Aperiens, ntis, 3; *adj.*
 Apiolum, 2.
 Apocynum, 2.
 Apomorphina, 1.
 Aqua, 1.
 Aralia, 1.
 Areca, 1.
 Argentum, 2.
 Arnica, 1.
 Aromaticus, a, um; *adj.*
 Arsenias, atis, 3, *m.*
 Arsenis, itis, 3, *m.*
 Arsenicum, 2.
 Arseniosus, a, um; *adj.*
 Arsenium, 2.
 Arum, 2.
 Asafætida, 1.
 Asarum, 2.
 Asclepias, adis, 3, *f.*
 Asellus, 2.
 Aspidium, 2.
 Aspidosperma, atis, 3, *n.*
 Atropina, 1.
 Aurantium, 2.
 Aurum, 2.
 Ava kava, *indecl.*
 Avena, 1.
 Axungia, 1.
 Azederach, *indecl.*
 Bacca, 1.
 Balsamum, 2.
 Baptisia, 1.
 Barbadosensis, e, 3; *adj.*
 Barium, 2.
 Beberina, 1.
 Belladonna, 1.
 Benzoas, atis, 3, *m.*

- Benzoë, oës, 1, *f*.
 Benzoicus, a, um; *adj*.
 Benzoinatus, a, um; *adj*.
 Benzoinum, 2.
 Berberina, 1.
 Berberis, idis, 3, *f*.
 Bergamum, 2.
 Biboras, atis, 3, *m*.
 Bicarbonas, atis, 3, *m*.
 Bichloridus, a, um; *adj*.
 Bichromas, atis, 3, *m*.
 Bismuthum, 2.
 Bisulphas, atis, 3, *m*.
 Bitartras, atis, 3, *m*.
 Blatta, 1.
 Boldus, 2.
 Bolus, 2.
 Boras, atis, 3, *m*.
 Borax, acis, 3, *m*.
 Boricus, a, um; *adj*.
 Brayera, 1.
 Bromidum, 2.
 Bryonia, 1.
 Buchu, *indecl*.
 Bulliens, entis; *adj*.
 Burgundicus, a, um; *adj*.
 Bursa, 1.
 Butyrum, 2.
 Cacao, *indecl*.
 Cactus, 2.
 Cadmium, 2.
 Caffea, 1.
 Caffaina, 1.
 Cajaputi, *indecl*.; or
 Cajapatum, 2.
 Calamus, 2.
 Calcium, 2.
 Calendula, 1.
 Calisaya, 1.
 Calomel, *indecl*.
 Calumba, 1.
 Calx, cis, 3, *f*.
 Camellia, 1.
 Camphora, 1.
 Camphoratus, a, um; *adj*.
 Canadensis, e, 3; *adj*.
 Canella, 1.
 Canna, 1.
 Cannabis, is, 3, *f*.
 Cantharis, idis, 3, *f*.
 Capensis, e, 3; *adj*.
 Capsella, 1.
 Capsicum, 2.
 Capsula, 1.
 Carbo, onis, 3, *m*.
 Carbolas, atis, 3, *m*.
 Carbolicus, a, um; *adj*.
 Carbonas, atis, 3, *m*.
 Carboneum, 2.
 Carbonicus, a, um; *adj*.
 Cardamomum, 2.
 Caro, carnis, 3, *f*.
 Carota, 1.
 Carthamus, 2.
 Carum, 2.
 Caryophyllus, 2.
 Cascara Sagrada, 1.
 Cascarilla, 1.
 Cassia, 1.
 Castanea, 1.
 Castoreum, 2.
 Cataplasma, atis, 3, *n*.
 Cataria, 1.
 Catechu, *indecl*.
 Catharticus, a, um; *adj*.
 Caulophyllum, 2.
 Cautchouc, *indecl*.
 Cedro, *indecl*.
 Centifolius, a, um; *adj*.
 Centigramma, 1.
 Centimetrum, 2.
 Cera, 1.
 Cerasus, 2, *f*.
 Ceratum, 2.
 Ceratus, a, um; *adj*.
 Cereus, 2.
 Cerevisia, 1.
 Ceriferus, a, um; *adj*.

- Cerium, 2.
 Cetaceum, 2.
 Cetraria, 1.
 Chamælririum, 2.
 Chamomilla, 1.
 Charta, 1.
 Chartula, 1.
 Chelidonium, 2.
 Chenopodium, 2.
 Chimaphila, 1.
 Chinoidinum, 2.
 Chionanthus, 2.
 Chirata, 1.
 Chloral, is, 3, n.
 Chloralum, 2.
 Chloras, atis, 3, m.
 Chloratus, a, um; *adj.*
 Chloridum, 2.
 Chlorinatus, a, um; *adj.*
 Chlorinium, 2.
 Chlorodyna, 1.
 Chloroformum, 2.
 Chondrus, 2.
 Chromicus, a, um; *adj.*
 Chrysarobinum, 2.
 Chrysophanicus, a, um; *adj.*
 Cicuta, 1.
 Cigareta, 1.
 Cimicifuga, 1.
 Cina, 1.
 Cinchona, 1.
 Cinchonidina, 1.
 Cinchonina, 1.
 Cinnamomum, 2.
 Citras, atis, 3, m.
 Citricus, a, um; *adj.*
 Citrus, 2.
 Coca, *indecl.*
 Cocaina, 1.
 Coccus, 2.
 Cochlear, is, 3, n.
 Cochlearia, 1.
 Codeina, 1.
 Coffea, 1.
 Colatura, 1.
 Colchicum, 2.
 Collinsonia, 1.
 Collodium, 2.
 Collutorium, 2.
 Collyrium, 2.
 Colocynthis, idis, 3, f.
 Columbo, *indecl.*
 Communis, e, 3; *adj.*
 Compositus, a, um; *adj.*
 Concentratus, a, um; *adj.*
 Concisus, a, um; *adj.*
 Confectio, onis, 3, f.; or
 Confectum, 2.
 Congius, 2.
 Conium, 2.
 Contusus, a, um; *adj.*
 Convallaria, 1.
 Copaiba, 1.
 Coptis, idis, 3, f.
 Coriandrum, 2.
 Coriaria, 1.
 Cornus, us, 4, f.
 Corrosivus, a, um; *adj.*
 Cortex, icis, 3, m.
 Corydalis, is, 3, f.
 Coto, *indecl.*
 Cotula, 1.
 Creasotum, 2.
 Cremor, oris, 3, m.
 Creta, 1.
 Crocus, 2.
 Croton, onis, 3, m.
 Crudus, a, um; *adj.*
 Cubeba, 1.
 Cuprum, 2.
 Curare, *indecl.*
 Curcuma, 1.
 Cyanidum, 2.
 Cydonium, 2.
 Cypripedium, 2.
 Damiana, 1.
 Datura, 1.
 Daucus, 2, f.

- Decigramma, 1.
 Decimetrum, 2.
 Decoctum, 2; or
 Decoctio, onis, 3, *f.*
 Delphinium, 2.
 Deodoratus, a, um; *adj.*
 Denarcotisatus, a, um; *adj.*
 Depuratus, a, um; *adj.*
 Despumatus, a, um; *adj.*
 Destillatus, a, um; *adj.*
 Dextrinum, 2.
 Diachylon, 2.
 Dialysatus, a, um; *adj.*
 Dies, ei, 5, *m.* or *f.*
 Digitalina, 1.
 Digitalis, is, 3, *f.*
 Dilutus, a, um; *adj.*
 Dimidius, a, um; *adj.*
 Dioscorea, 1.
 Diospyros, 2.
 Dipterix, igis, 3, *f.*
 Dita, 1.
 Dosis, is, 3, *f.*
 Doverus, 2.
 Drachma, 1.
 Dracontium, 2.
 Dragmis, is, 3, *f.*
 Duboisia, 1.
 Dulcamara, 1.
 Dulcis, e, 3; *adj.*
 Effervescens, entis, 3; *adj.*
 Elaterium, 2.
 Elaterinum, 2.
 Elæosaccharum, 2.
 Electuarium, 2.
 Elemi, *indecl.*
 Elixir, iris, 3, *n.*
 Emplastrum, 2.
 Emulsio, onis, 3, *f.*
 Enema, atis, 3, *n.*
 Ergota, 1.
 Ergotina, 1.
 Erigeron, ontis, 3, *m.*
 Eriodyction, 2.
 Erythroxyton, 2.
 Eucalyptus, 2, *m.* or *f.*
 Euonymus, 2.
 Eupatorium, 2.
 Euphorbia, 1.
 Euphorbium, 2.
 Expressus, a, um; *adj.*
 Exsiccatus, a, um; *adj.*
 Extractum, 2.
 Faba, 1.
 Farina, 1.
 Farinosus, a, um; *adj.*
 Fel, fellis, 3, *n.*
 Fermentum, 2.
 Ferratus, a, um; *adj.*
 Ferricus, a, um; *adj.*
 Ferrocyanidum, 2.
 Ferrosus, a, um; *adj.*
 Ferrum, 2.
 Fervidus, a, um; *adj.*
 Ficus, 2 or 4, *f.*
 Filix, icis, 3, *f.*
 Fistula, 1.
 Flavus, a, um; *adj.*
 Flexilis, e, 3; *adj.*
 Florentinus, a, um; *adj.*
 Floridus, a, um; *adj.*
 Flos, floris, 3, *m.*
 Fluidrachma, 1.
 Fluiduncia, 1.
 Fluidus, a, um; *adj.*
 Fluigramma, 1.
 Fœniculum, 2.
 Fœtidus, a, um; *adj.*
 Folium, 2.
 Fontanus, a, um; *adj.*
 Fortis, e, 3; *adj.*
 Fowlerus, 2.
 Frangula, 1.
 Frankenia, 1.
 Frasera, 1.
 Fructus, us, 4, *m.*
 Frumentum, 2.
 Fuligo, inis, 3, *f.*

- Fungus, 2.
 Fuscus, a, um; *adj.*
 Fusus, a, um; *adj.*
 Galanga, 1.
 Galbanum, 2.
 Galla, 1.
 Gallicus, a, um; *adj.*
 Gambogia, 1.
 Gargarisma, atis, 3, *n.*
 Gaultheria, 1.
 Gelatina, 1.
 Gelsemium, 2.
 Gemma, 1.
 Gentiana, 1.
 Geranium, 2.
 Geum, 2.
 Gillenia, 1.
 Glabrus, a, um; *adj.*
 Glacialis, e, 3; *adj.*
 Glucosa, 1.
 Glycerinum, 2.
 Glyceritum, 2.
 Glycyrrhiza, 1.
 Glycyrrhizinum, 2.
 Gossypium, 2.
 Goulardus, 2.
 Gramen, inis, 3, *n.*
 Gramma, 1; or
 Gramma, atis, 3, *n.*
 Granatum, 2.
 Granulatus, a, um; *adj.*
 Granulum, 2.
 Granum, 2.
 Grindelia, 1.
 Guaco, *indecl.*
 Guaiacum, 2.
 Guarana, 1.
 Gummi, *indecl.*
 Gummigutta, 1.
 Gutta, 1.
 Gutta-percha, æ, 1.
 Hæmatoxylo, 2.
 Hæmostaticus, a, um; *adj.*
 Hamamelis, idis, 3, *f.*
 Haustum, 2; or
 Haustus, us, 4, *m.*
 Hedeoma, 1.
 Helenium, 2.
 Helianthemum, 2.
 Helleborus, 2.
 Helonias, æ, 1, *f.*
 Hepatica, 1.
 Herba, 1.
 Heuchera, 1.
 Hippocastanum, 2.
 Hirudo, inis, 3, *f.*
 Hoffmannus, 2.
 Hordeum, 2.
 Humulus, 2.
 Hydrargyrum, 2.
 Hydras, atis, 3, *m.*
 Hydrastina, 1.
 Hydrastis, is, 3, *f.*
 Hydratus, a, um; *adj.*
 Hydriodas, atis, 3, *m.*
 Hydriodicus, a, um; *adj.*
 Hydrobromas, atis, 3, *m.*
 Hydrobromicus, a, um; *adj.*
 Hydrochloras, atis, 3, *m.*
 Hydrochloricus, a, um; *adj.*
 Hydrocyanicus, a, um; *adj.*
 Hydrogenium, 2.
 Hyoscyamina, 1.
 Hyoscyamus, 2.
 Hypophosphis, itis, *m.*
 Hyposulphis, itis, *m.*
 Hyssopus, 2.
 Ichthyocolla, 1.
 Idæus, a, um; *adj.*
 Ignatia, 1.
 Illicium, 2.
 Imperatoria, 1.
 Impurus, a, um; *adj.*
 Incarnatus, a, um; *adj.*
 Indicus, a, um; *adj.*
 Indigo, *indecl.*
 Infusum, 2; or
 Infusio, onis, 3, *f.*

Inhalatio, onis, 3, *f.*; or
 Inhalatus, us, 4, *m.*
 Injectio, onis, 3, *f.*; or
 Injectus, us, 4, *m.*
 Inspissatus, a, um; *adj.*
 Inula, 1.
 Iodatus, a, um; *adj.*
 Iodidum, 2.
 Iodinium, 2.
 Iodoformum, 2.
 Iodum, 2.
 Ipecacuanha, 1.
 Iris, idis, 3, *f.*
 Islandicus, a, um; *adj.*
 Jaborandi, *indecl.*
 Jalapa, 1.
 Jecur, oris, 3, *n.*
 Juglans, andis, 3, *f.*
 Juniperus, 2, *f.*
 Kali, *indecl.*
 Kalium, 2.
 Kamala, 1.
 Kava Kava, *indecl.*
 Kino, *indecl.*
 Koumiss, *indecl.*
 Kousso, *indecl.*
 Krameria, 1.
 Lac, lactis, 3, *n.*
 Lactas, atis, 3, *m.*
 Lacticus, a, um; *adj.*
 Lactuca, 1.
 Lactucarium, 2.
 Lagena, 1.
 Laminaria, 1.
 Lanolinum, 2.
 Laudanum, 2.
 Lapis, idis, 3, *m.*
 Lappa, 1.
 Laurocerasus, 2, *f.*
 Laurus, 2 or 4, *f.*
 Lavamentum, 2.
 Lavandula, 1.
 Lavatura, 1.
 Leonurus, 2.

Leptandra, 1.
 Levisticum, 2.
 Lex, legis, 3, *f.*
 Libra, 1.
 Libitum, 2.
 Lichen, inis, 3, *m.*
 Lignum, 2.
 Limatura, 1.
 Limon, is, 3, *f.*
 Limonia, 1.
 Linctus, us, 4, *m.*
 Linimentum, 2.
 Linum, 2.
 Liquidus, a, um; *adj.*
 Liquiritia, 1.
 Liquor, oris, 3, *m.*
 Liriodendron, 2.
 Lithium, 2.
 Lobelia, 1.
 Lotio, onis, 3, *f.*
 Lotus, a, um; *adj.*
 Lupulinum, 2.
 Lupulus, 2.
 Lycopodium, 2.
 Lycopus, odis, 3; or 2, *m.*
 Lytta, 1.
 Macis, idis, 3, *f.*
 Madeirensis, e, 3; *adj.*
 Magma, atis, 3, *m.*
 Magnesia, 1.
 Magnesium, 2.
 Magnolia, 1.
 Maltum, 2.
 Manganum, 2.
 Mangostana, 1.
 Manna, 1.
 Manzanita, 1.
 Maranta, 1.
 Marilandicus, a, um; *adj.*
 Marrubium, 2.
 Mas, aris, 3, *m.*
 Massa, 1.
 Mastiche, es, 1, *f.*
 Matico, *indecl.*

- Matricaria, 1.
 Mays, dis, 3, *f.*; or
 Mais, *indecl.*
 Medulla, 1.
 Mel, mellis, 3, *n.*
 Melilotus, 2.
 Melissa, 1.
 Mellitum, 2.
 Melo, onis, 3, *f.*
 Menispermum, 2.
 Mentha, 1.
 Menthol, is, 3, *m.*
 Menyanthes, æ, 1, *f.*
 Methysticum, 2.
 Metrum, 2.
 Mezereum, 2.
 Mica, 1.
 Micromeria, 1.
 Mikania, 1.
 Millefolium, 2.
 Milligramma, 1.
 Millimetrum, 2.
 Mindererus, 2.
 Minimum, 2.
 Mistura, 1.
 Mitchellia, 1.
 Mitis, e, 3; *adj.*
 Monarda, 1.
 Monesia, 1.
 Monobromatus, a, um; *adj.*
 Morphia, 1.
 Morphina, 1.
 Morrhua, 1.
 Morum, 2.
 Moschus, 2.
 Moxa, 1.
 Mucilago, inis, 3, *f.*
 Mucuna, 1.
 Murias, atis, 3, *m.*
 Muriaticus, a, um; *adj.*
 Myrcia, 1.
 Myrica, 1.
 Myristica, 1.
 Myrotheca, 1.
 Myrrha, 1.
 Narcotina, 1.
 Natrium, 2.
 Natronatus, a, um; *adj.*
 Nectandra, 1.
 Nicotina, 1.
 Niger, gra, grum; *adj.*
 (Gen. of *niger* is *nigri*.)
 Nitras, atis, 3, *m.*
 Nitricus, a, um; *adj.*
 Nitris, itis, 3, *m.*
 Nitrohydrochloricus, a, um; *adj.*
 Nitromuriaticus, a, um; *adj.*
 Nitrosus, a, um; *adj.*
 Nux, nucis, 3, *f.*
 Nymphæa, 1.
 Octarius, 2.
 Odoratus, a, um; *adj.*
 Oleas, atis, 3, *m.*
 Oleatum, 2.
 Oleoresina, 1.
 Oleum, 2.
 Oliva, 1.
 Olla, 1.
 Opium, 2.
 Opodei doc, *indecl.*
 Optimus, a, um; *adj.*
 Opulus, 2, *f.*
 Oregonensis, e, 3; *adj.*
 Origanum, 2.
 Oryza, 1.
 Os, ossis, 3, *n.*
 Ovum, 2.
 Oxalas, atis, 3, *m.*
 Oxalicus, a, um; *adj.*
 Oxidum, 2.
 Oxycroceus, a, um; *adj.*
 Oxymel, mellis, 3, *n.*; or
 Oxymeli, itis, 3, *n.*
 Pallidus, a, um; *adj.*
 Pancreatinum, 2.
 Panis, is, 3, *m.*
 Papaver, eris, 3, *n.*
 Papaya, 1.

- Paraffinum, 2.
 Paregoricum, 1.
 Pareira, 1,
 Pars, partis, 3, *f.*
 Parvulum, 2.
 Pasma, atis, 3, *n.*
 Passa, 1.
 Pastilla, 1.
 Paullinia, 1.
 Pauper, eris, 3; *adj.*
 Pepo, onis, 3, *m.*
 Pepsinum, 2.
 Perforatus, a, um; *adj.*
 Permanganas, atis, 3, *m.*
 Peroxidum, 2.
 Peruvianus, a, um; *adj.*
 Pessarium, 2; or
 Pessum, 2.
 Petrolatum, 2.
 Petroleum, 2.
 Petroselinum, 2.
 Phiala, 1.
 Phoradendron, 2.
 Phosphas, atis, 3, *m.*
 Phosphis, itis, 3, *m.*
 Phosphoratus, a, um; *adj.*
 Phosphoricus, a, um; *adj.*
 Phosphorus, 2.
 Physostigma, atis, 3, *n.*
 Physostigmina, 1.
 Phytolacca, 1.
 Picricus, a, um; *adj.*
 Picrotoxinum, 2.
 Pilocarpina, 1.
 Pilocarpus, 2.
 Pimenta, 1.
 Pinus, 2 or 4, *f.*
 Piper, eris, 3, *n.*
 Piperina, 1.
 Piperitus, a, um; *adj.*
 Piscidia, 1.
 Pix, picis, 3, *f.*
 Plumbum, 2.
 Podophyllum, 2.
 Podophyllum, 2.
 Pollen, inis, 3, *n.*
 Polygala, 1.
 Polygonum, 2.
 Polypodium, 2,
 Pomatum, 2.
 Pomatus, a, um; *adj.*
 Populus, 2, *f.*
 Porcus, 2.
 Portensis, e, 3; *adj.*
 Potassa, 1.
 Potassium, 2.
 Potio, onis, 3, *f.*; or
 Potus, us, 4, *m.*
 Praecipitatus, a, um; *adj.*
 Praeparatus, a, um; *adj.*
 Praescriptum, 2; or
 Praescriptio, onis, 3, *f.*
 Precatorius, a, um; *adj.*
 Prinos, 2.
 Propylamina, 1.
 Protochloridum, 2.
 Protoiodidum, 2.
 Prunifolius, a, um; *adj.*
 Prunum, 2.
 Prunus, 2, *f.*
 Ptelea, 1.
 Pulpa, 1.
 Pulsatilla, 1.
 Pulvis, eris, 3, *m.* or *f.*
 Purificatus, a, um; *adj.*
 Purus, a, um; *adj.*
 Pyrethrum, 2.
 Pyrogallicus, a, um; *adj.*
 Pyrolignicus, a, um; *adj.*
 Pyrophosphas, atis, 3, *m.*
 Pyrophosphoricus, a, um; *adj.*
 Pyroxylinum, 2; or
 Pyroxylon, 2.
 Quassia, 1.
 Quebracho, *indecl.*
 Quercus, us, 4, *f.*
 Quillaia, 1.
 Quinia, 1.

- Quinidia, 1.
 Quinina, 1.
 Quinquefolius, a, um; *adj.*
 Radix, icis, 3, *f.*
 Ranunculus, 2.
 Recens, ntis, 3; *adj.*
 Receptum, 2.
 Rectificatus, a, um; *adj.*
 Redactus, a, um; *adj.*
 Resina, 1.
 Rhamnus, 2, *f.* or *m.*
 Rhatanha, 1.
 Rheum, 2.
 Rhus, rhois, *m.* or *f.*
 Ricinus, 2.
 Roob, is, 3, *n.*; or
 Roob, *indecl.*
 Rosa, 1.
 Rosmarinus, 2.
 Rottlera, 1.
 Rotula, 1.
 Rubella, 1.
 Ruber, bra, brum; *adj.*
 (Gen. of *ruber* is *rubri.*)
 Rubia, 1.
 Rubus, 2.
 Rumex, icis, 3, *m.* or *f.*
 Ruta, 1.
 Sabadilla, 1.
 Sabbatia, 1.
 Sabina, 1.
 Saccharatus, a, um; *adj.*
 Saccharum, 2.
 Sago, *indecl.*
 Sal, salis, 3, *n.* or *m.*
 Salep, *indecl.*
 Salicylas, atis, 3, *m.*
 Salicylicus, a, um; *adj.*
 Salicinum, 2.
 Salix, icis, 3, *f.*
 Salvia, 1.
 Sambucus, 2.
 Sanguinaria, 1.
 Santalum, 2.
 Santonica, 1.
 Santoninas, atis, 3, *m.*
 Santoninum, 2.
 Sapo, onis, 3, *m.*
 Sarsaparilla, 1.
 Sassafras, *indecl.*
 Sativus, a, um; *adj.*
 Saturatio, onis, 3, *f.*
 Scammonium, 2.
 Scatula, 1.
 Scilla, 1.
 Scoparius, 2.
 Scrupulus, 2.
 Scutellaria, 1.
 Secale, is, 3, *n.*
 Seditum, 2.
 Semen, inis, 3, *n.*
 Semidrachma, 1.
 Semissis, e, 3; *adj.*
 Senega, 1.
 Senna, 1.
 Sericus, a, um; *adj.*
 Sericum, 2.
 Serpentaria, 1.
 Serrulatus, a, um; *adj.*
 Sesamum, 2.
 Sesquichloridum, 2.
 Sevum, 2.
 Simaruba, 1.
 Simplex, icis, 3; *adj.*
 Sinapis, is, 3, *f.*
 Socotrinus, a, um; *adj.*
 Soda, 1.
 Sodium, 2.
 Solidago, inis, 3, *f.*
 Solubilis, e, 3; *adj.*
 Solutio, onis, 3, *f.*
 Sparadrapum, 2.
 Species, icrum, pl., 5, *f.*
 Spermaceti, *indecl.*
 Spigelia, 1.
 Spiraea, 1.
 Spiritus, us, 4, *m.*
 Spongia, 1.

- Statice, es, 1, *f*.
 Stibium, 2.
 Stigma, atis, 3, *n*.
 Stillingia, 1.
 Stramonium, 2.
 Strychnia, 1.
 Strychnina, 1.
 Stypticus, a, um; *adj*.
 Styrax, acis, 3, *m*. or *f*.
 Subacetas, atis, 3, *m*.
 Subcarbonas, atis, 3, *m*.
 Sublimatus, a, um; *adj*.
 Subnitras, atis, 3, *m*.
 Subsulphas, atis, 3, *m*.
 Succinum, 2.
 Succus, 2.
 Sulphas, atis, 3, *m*.
 Sulphis, itis, 3, *m*.
 Sulphocarbolas, atis, 3, *m*.
 Sulphur, is, 3, *n*.
 Sulphuratus, a, um; *adj*.
 Sulphuretus, a, um; *adj*.
 Sulphuricus, a, um; *adj*.
 Sulphurosus, a, um; *adj*.
 Sumbul, *indecl*.
 Suppositorium, 2.
 Syriacus, a, um; *adj*.
 Syrinx, ngis, 3, *f*.
 Syrupus, 2.
 Tabacum, 2.
 Tabella, 1.
 Tamarindus, 2.
 Tanacetum, 2.
 Tannicus, a, um; *adj*.
 Tanninum, 2.
 Tapioca, 1.
 Taraxacum, 2.
 Tartaricus, a, um; *adj*.
 Tartras, atis, 3, *m*.
 Tepidus, a, um; *adj*.
 Terebinthina, 1.
 Tersulphas, atis, 3, *m*.
 Testa, 1.
 Thea, 1.
 Thebaicus, a, um; *adj*.
 Theina, 1.
 Theobroma, 1.
 Theriaca, 1.
 Thuja, 1.
 Thymol, is, 3, *m*.; or
 Thymolum, 2.
 Thymus, 2.
 Tiglium, 2.
 Tilia, 1.
 Tinctorius, a, um; *adj*.
 Tinctura, 1.
 Tolu, *indecl*.
 Tolutanus, a, um; *adj*.
 Tonco, *indecl*.
 Tonga, 1.
 Tormentilla, 1.
 Tostus, a, um; *adj*.
 Toxicodendron, 2.
 Tragacantha, 1.
 Trifolium, 2.
 Trillium, 2.
 Triosteum, 2.
 Triticum, 2.
 Trituratio, onis, 3, *f*.
 Trochiscus, 2.
 Truncus, 2.
 Tuber, eris, 3, *n*.
 Tuberosus, a, um; *adj*.
 Tussilago, inis, 3, *f*.
 Ulmus, 2, *f*.
 Uncia, 1.
 Unguentum, 2; or
 Unguen, inis, 3, *n*.
 Urari, *indecl*.
 Ursus, 2.
 Urtica, 1.
 Ustilago, inis, 3, *f*.
 Ūstus, a, um; *adj*.
 Uva, 1.
 Valeriana, 1.
 Valerianas, atis, 3, *m*.
 Valerianicus, a, um; *adj*.
 Vanilla, 1.

Vaselinum, 2.	Volatilis, e, 3; <i>adj.</i>
Vegetabilis, e, 3; <i>adj.</i>	Vomicus, a, um; <i>adj.</i>
Venalis, e, 3; <i>adj.</i>	Vulgaris, e, 3; <i>adj.</i>
Veratria, 1.	Vuluerarius, a, um; <i>adj.</i>
Veratrina, 1.	Warburgus, 2.
Veratrum, 2.	Wintera, 1.
Verbascum, 2.	Woorari, <i>indecl.</i> ; or
Veronica, 1.	Woorali, <i>indecl.</i>
Versicolor, oris, 3; <i>adj.</i>	Xanthorrhiza, 1.
Vesicatorius, a, um; <i>adj.</i>	Xanthoxylum, 2.
Vesicatorium, 2.	Xericus, a, um; <i>adj.</i>
Vesiculosus, a, um; <i>adj.</i>	Xerium, 2.
Viburnum, 2.	<i>Yerba Buena</i> , 1.*
Viola, 1.	<i>Yerba Mansa</i> , 1.*
Vinum, 2.	<i>Yerba Reuma</i> , 1.*
Virginianus, a, um; <i>adj.</i>	<i>Yerba Santa</i> , 1.*
Virginicus, a, um; <i>adj.</i>	Zea, 1.
Viridis, e, 3; <i>adj.</i>	Zedoaria, 1.
Virosus, a, um; <i>adj.</i>	Zeylanicus, a, um; <i>adj.</i>
Viscum, 2.	Zingiber, eris, 3, <i>n.</i>
Vitellus, 2.	Zincum, 2.
Vitrum, 2.	Zizyphus, 2, <i>f.</i>

VERBS.

But few verbs are used in prescriptions, and these, with few exceptions, only in the imperative mood, so that it is not necessary to describe the conjugations at all, and it will be sufficient to merely mention the verbs in the forms in which they are used. The following list includes the most important. The number after the verb refers to the number of the conjugation:

Addē.—Active voice, imperative mood, present tense, and singular number of the verb *addo*, 3. It means “add,” and is followed by the accusative case.

Cola.—Active voice, imperative mood, present tense, and singular number of the verb *colo*, 1. It means “strain.”

Consperge.—Active voice, imperative mood, present tense, and singular number, of the verb *conspergo*, 3. It means “sprinkle,” and is used, for example, in prescriptions for pills, to designate the powder with which the pills are to be rolled. It is an active verb, and its object (the thing to be sprinkled) is placed in the accusative case,

*These are Spanish names, both words of which are either treated in prescriptions like Latin words of the first declension, or may be considered indeclinable.

followed by the ablative of the substance with which it is sprinkled. In prescriptions, however, the object is generally omitted or understood, and the verb is followed by the ablative of the conspergative. In English we might say "sprinkle the pills with lycopodium," or "sprinkle lycopodium on the pills." In Latin the first form is generally used, and we would write "*consperge pilulas lycopodio*," or "*consperge (pilulas understood) lycopodio*." In the last form the verb is, of course, only apparently followed by the ablative.

Da.—Active voice, imperative mood, present tense, and singular number of the verb *do*, 1. It means "give."

Datus, a, um.—Participial adjective of the same verb; means "given."

Detur, singular; and

Dentur, plural.—Passive voice, subjunctive mood, present tense, third person, singular and plural respectively, of the same verb. These words mean "let — be given." The subject, or thing to be given is placed in the nominative, singular or plural as the case may be.

Divide.—Active voice, imperative mood, present tense, and singular number of the verb *divido*, 3. It means "divide," and is usually followed by the preposition *in* and the accusative case.

Fiat, singular; and

Fiant, plural.—The verb *fio* is an irregular passive verb, active in form, but passive in meaning. It is used as the passive of *facio*, 3, I make. It, therefore, means, "I am made," or, in the infinitive, "to be made." The forms in which it is used are the subjunctive mood, present tense, and third person, singular and plural. The thing or things to be made are placed in the nominative case. *Fiat* and *fiant* means "let — be made," the dash meaning the proper subject, singular or plural, as the case may be; thus: *fiat emulsio* means "let an emulsion be made;" *fiant pilulæ XII* means "let twelve pills be made."

Misce.—Active voice, imperative mood, present tense, and singular number of the verb *misceo*, 2. It means "mix."

Misceantur.—Passive voice, subjunctive mood, present tense, third person, and plural number of the verb *misceo*, 2. It means "let (them) be mixed."

Obducantur.—Passive voice, subjunctive mood, present tense, third person, plural number of the verb *obduco*, 3. The word means "let (them) be coated," and is used in formulæ for pills. The substance with which the pills are to be coated is put in the ablative; for instance: *Pilulæ foliis auri obducantur*, let the pills be coated with gold-leaf (literally, with leaves of gold).

Recipe.—Active voice, imperative mood, present tense, and singular

number of the verb *recipio*, 3. Means "take," and is followed by the accusative of the thing or things to be taken.

Repete.—Active voice, imperative mood, present tense, and singular number of the verb *repeto*, 3. It means "repeat" or "renew," and is followed by the accusative.

Signa.—Active voice, imperative mood, present tense, and singular number of the verb *signo*, 1. It means "label."

Solve.—Active voice, imperative mood, present tense, and singular number of the verb *solvo*, 3. It means "dissolve."

Tere.—Active voice, imperative mood, present tense, and singular number of the verb *tero*, 3. It means "rub" or "triturate."

To recapitulate, we have the following table of verbs and the usual abbreviations in parentheses, followed by the meaning in English. Where no abbreviation is given, it means that the word is usually written out in full.

Latin.	English.
<i>Adde</i>	add.
<i>Cola</i>	strain.
<i>Consperge</i> (<i>consp.</i>).....	sprinkle.
<i>Da</i> (<i>d.</i>).....	give.
<i>Detur</i> (<i>d.</i>)....	let (it) be given.
<i>Dentur</i> (<i>d.</i>).....	let (them) be given.
<i>Divide</i> (<i>div.</i>)	divide.
<i>Fiat</i> (<i>ft.</i>)	let (it) be made.
<i>Fiant</i> (<i>ft.</i>)	let (them) be made.
<i>Misce</i> (<i>m.</i>)	mix.
<i>Misceantur</i> (<i>m.</i>)	let (them) be mixed.
<i>Obducantur</i>	let (them) be coated.
<i>Recipe</i> (<i>℞</i>).....	take.
<i>Repete</i>	repeat; renew.
<i>Signa</i> (<i>s.</i>).....	label.
<i>Solve</i>	dissolve.
<i>Tere</i>	rub; triturate.

ADVERBS.

Ana, usually written $\bar{a}\bar{a}$, means "of each." When equal quantities of several consecutive ingredients of a prescription are to be dispensed, this adverb is placed after the name of the last of these ingredients and before the quantity.

Quantum satis, usually abbreviated to *q. s.*, consists of two adverbs, *quantum* ("as much as") and *satis* ("enough"), both together meaning "as much as will suffice," or "as much as may be necessary," or

simply "enough." Sometimes *q. s.* is said to be "*quantum sufficit*" (not *sufficiat*), which, however, means the same thing, *sufficit* being a verb meaning "it suffices." It will be simplest always to read *q. s.* as *quantum satis*. The name of the drug must be in the genitive.

The use of *q. s.* will be considered further on.

PARTS OF PRESCRIPTION.

The prescription is divided into several parts, each of which is distinct from the others. These parts are: First, the *superscription*, or order to "take," usually consisting of the sign \mathcal{R} ; second, the *inscription*, or enumeration of the ingredients; third, the *subscription*, or directions to the pharmacist how to compound; and fourth, the *signature*, or direction for labeling.

We will consider these parts more in detail a little further on.

CONSTRUCTION OF PRESCRIPTION.

To recapitulate in regard to the grammatical form of the prescription, we remark that it commences with the imperative "take" (\mathcal{R}), which is followed by the genitive of the name of the substance and sative of the quantity, thus:

Superscription— \mathcal{R} .

Inscription— **Remedy** (gen.). **Quantity** (acc.).
(Repeat for each ingredient.)

Subscription— **Misce** (etc.).

Signature— **Signa** (etc.).

It is to be remembered, however, that only the nominatives of an official or pharmaceutical name are to be changed to the genitive, all other words of the official names remaining unchanged, as, for instance, if we order *hydrargyrum cum creta*, only the first word is changed to the genitive, the ablative *creta* following *cum* remaining as it is. Moreover, the nominative of the official title is changed to the genitive only when a certain *quantity* (grains, drams, ounces, grams, etc.) is ordered.

When no *quantity*, but a certain *number*, is ordered, as occasionally in prescriptions for pills, the number is expressed by a numeral adjective, and the object of the verb *recipe* then is the substance or remedy which must accordingly be placed in the accusative case, as when we write.

\mathcal{R} —*Pilulas catharticas*, viii.

Signa, etc.

We may have both constructions in the same prescription, as, for instance:

R—Chloroformi,	f ℥ i.
Olei morrhuæ,	f ℥ i.
Vitellum ovi,	i.
Syrupi sacchari,	f ℥ i.
Aquam puram, ad	f ℥ vi.

Misce. Fiat emulsio. Signa.

It will be noticed that when a quantity is ordered, the nominative of the title of the remedy is changed to the genitive; otherwise the nominative changes to the accusative, as when *one* yolk of egg is ordered or when *enough* water is prescribed to make 6 fluidounces.

NOMENCLATURE.

In constructing the nomenclature of any science, one object should be to convey as much information as possible in the names adopted. In botany, for instance, we find names of genera which convey certain ideas concerning the plant. *Digitalis* is a name derived from the Latin word *digitus*—a finger—and the name as applied to the plant refers to the thimble-like shape of the flower. The English word fox-glove, and the German word *fingerhut*, have similar significance, and other languages have words of like meaning. It need not, however, be supposed that these names have been independently invented by persons in different countries, but they probably are all derived from the conceit of the first one who gave the Latin name. Or the name may suggest the history of the plant, as is the case with cinchona, which is named in honor of the Countess of Chinchon, and the name recalls all of the romantic history of the conquest of Peru to any one who has ever read about it. Or the plants are named in honor of great men, as “Wellingtonia,” “Tradescantia,” etc. Often it is the specific name which gives the desired information: *Cinchona macrocalycis*, cinchona with the large calyx; *Digitalis purpurea*, the purple-colored digitalis; *Cassia acutifolia*, cassia with the acutely pointed leaf, etc. Among animals the *Physeter macrocephalus* may serve as an example of the same general truth.

Who that has studied chemistry does not know that the names of chemicals convey the knowledge of their composition; that a sulphate, for instance, is a compound of a base with sulphuric acid. And so in every branch of science, in proportion as it approaches perfection its nomenclature becomes more exact, and the science is more easily mastered by the student.

It is true that occasionally names become attached to certain things, and that it is afterwards difficult to change the names when they cease to convey correct information. For example, *Oidium abortifaciens*—

literally, the abortion-making oidium—was so named because it was thought to be the cause of the abortion of the ovule of rye and the production of ergot. Now we know that it has nothing to do with the formation of the ergot, and, besides, the latter is not an aborted rye grain at all, so that the specific name is wrong in all its parts, but it still continues to be used.

In other cases the names change as knowledge advances. Cinchona was first known as *pulvis de la comtessa*, because the Countess of Chinchon introduced it to the notice of the old world; as *pulvis patrum* or *pulvis Jesuiticus*, because first sold by the Jesuit fathers. A certain variety is even to this day spoken of as “Crown Bark,” because it was considered a couple of centuries ago to be the best bark, and its sale was a prerogative of the Spanish crown. But these names gradually fell into disuse as the knowledge in regard to this drug and its sources widened. It seems to me that some of the principles which govern the development of scientific nomenclature in other branches of human thought and activity might well be applied to our pharmaceutical nomenclature, which is now lamentably imperfect. For instance, the present pharmacopœial name *Iris* conveys no information at all. The name does not tell us what the drug is, or from what it is derived; whether it is a root, rhizoma, leaves, flowers, or what else. And, moreover, it does not refer to the same drug *Iris* which was formerly used. The name should, as far as possible, give us the above information.

In the Pharmacopœia of 1870 *extractum aconiti* meant an extract of the leaves, while in that of 1880 the same name means an extract of the root. When a physician who is behind the times prescribes this preparation he probably means the extract of aconite leaves, and if it comes to be dispensed by a pharmacist who is up with the times he ought to, and probably will, dispense the extract of aconite root, and the patient takes five times as strong a dose as was intended, and possibly dies a victim to imperfect nomenclature.

The United States Pharmacopœia simply ignores all remedies not contained in itself, and bases its nomenclature on the idea that only that part of a plant is used which it recognizes. As a matter of fact, however, the part recognized by the Pharmacopœia is often not the part of the plant most generally employed, as we see in *Calendula*. Formerly this meant the flowers, now it means the herb or flowering tops; but, although the herb is official, the flowers continue to be commonly employed.

All modern systems of pharmacognosy are based on the structural characteristics of the drugs, and these should, therefore, be the base for our nomenclature. When we speak of rhubarb, for example, the name should tell us that the drug is the root, and so on. But it be-

comes an interesting question for discussion whether we should say *radix rhei* or *rhei radix*, or whether we should use the singular *radix* or the plural *radices*; also, whether the singular or plural of the origin of the drug shall be used in such names as *oleum olivæ* or *oleum olivarum*, etc. The question in regard to plural or singular has been settled by common consent in favor of the singular, and, as this is no doubt correct practice, we will not stop to discuss it now. But something may be said in regard to the precedence of words in the title. Shall the plant name be first and the plant part second, or *vice versa*? This question involves some points of interest to which it may be well to devote a few words of discussion. It involves, in the first place, the consideration of the idiomatic construction of languages. In French we say, for instance, "*une femme charmante*"—a woman charming—while in English we say, "a charming woman."

If we analyze the mental process of the conveyance of ideas by means of words, it seems that the French method is not as good as the English. Thought is instantaneous and so rapid in its action that often a person who supposes himself to be drowning reviews his whole life, with all its good and evil deeds, in the few seconds of submersion before he is rescued. Therefore, when the Frenchman says "the woman charming" the mind, hearing the word "woman" (*femme*), may think of the structural and physiological features which constitute the woman, and may think of all kinds of women, of all times and all nations, from Xantippe to Florence Nightingale, and from the naked Papuan to the brilliant society queen, before the following word (*charmante*) calls the mind back to the idea conveyed by that word, and all the other involuntary and irrelevant mental suggestions must be eliminated in order to limit the idea to the conception of one kind of woman only—the *charming* woman. In English or German, on the other hand, the adjective conjures up an abstract idea, and when the noun follows, the total idea is much more clearly defined, and the ideas are impressed with a vigor and clearness that seem to be impossible with the French construction.

In Latin also, the adjective is generally placed before the noun to which it belongs, as in English and German.

Now, apply this to our drugs. Shall we say *radix rhei*, or *rhei radix*?

Radix rhei is the French construction in effect. The mention of the word *radix* suggests so many facts regarding structure, etc., that it takes an effort of the mind to limit the idea to the conception of the single root derived from rhubarb. On the other hand, *rhei radix* will suggest rhubarb alone to the mind, and it is no effort at all to form an idea of the root of that plant alone. Our nomenclature should, therefore, include the name of the part of the plant, and such names

as *aconiti radix*, *sennæ folium*, *arnicæ flos*, *maydis stigma*, *cinchonæ cortex*, would be preferable to *radix aconiti*, *folium sennæ*, etc. This method of nomenclature has been adopted in this work, and examples of it, as applied to pharmaceutical preparations, may be seen in the enumeration of the fluid extracts, tinctures, etc., in the earlier pages of this book.

Another advantage gained by a nomenclature constructed as above explained is, that if we know the name of the plant we can find references in the dispensatories, etc., in alphabetical order, and if the names of the preparations are constructed in the same manner we gain the advantage that the description of the drug, and of all of its preparations will be found in one place, and in alphabetical order.*

For instance, referring to *aconiti radix*, we will find abstract, extract, fluid extract, liniment, tincture, etc., all together. A mere glance will tell the physician not only that it is aconite, but that it is the root of aconite, and it will also suggest all the different forms in which he may prescribe it. The name suggests volumes of information, and both pharmacists and physicians must become better acquainted with the materia medica. If a glance at the Pharmacopœia will give all this information, it becomes desirable that every physician should have a copy of that work. With the present nomenclature and arrangement, the Pharmacopœia is of comparatively little use to the doctor.

When their knowledge of materia medica is increased, physicians will prescribe more simples, and the arts of prescribing and compounding will receive an impetus which they can not receive in any other manner. The unfamiliarity of physicians with the articles of the materia medica and with the preparations accounts for many of the unsatisfactory conditions of both of the medical professions.

Since a proper nomenclature will aid in a better knowledge of pharmacognosy and pharmacy, it is certainly desirable that pharmaceutical nomenclature should be made commensurate with the advancements of our professions in other matters.

ABBREVIATIONS.

Although it is best to write out all the words of a prescription in full, there can be no serious objection to the almost universal habit of abbreviating the names of the ingredients. Several objects are aimed at and gained by using these abbreviations. We avoid the trouble of learning the Latin case endings; we save time and trouble, and often

*See, for instance, the arrangement adopted in the "Companion to the United States Pharmacopœia," by Professors Oscar Oldberg, Ph. D., and Otto A. Wall, M. D., Ph. G.

make the prescription even more readable to the druggist than when written out in full.

Another, and by no means slight, reason for abbreviating is that the prescription written in abbreviations becomes even less intelligible to the public than a Latin prescription written out in full, and in cases where it is desirable to keep the patient in ignorance of the remedy he is taking proper abbreviations may contribute materially to this result. In this connection it may be well to remind druggists that they often injure the physician, the patient, and themselves by entering into explanations to an inquisitive customer in regard to the ingredients of a prescription. If any such explanations are to be made they can be made by the physician, and certainly should not be made by the druggist. The physician does not like this meddling with his affairs any more than the druggist likes the physician to tell the patient the intrinsic value of the ingredients of the prescription.

But the above advantages are only gained by using proper abbreviations, by which we mean such as can not, under any circumstances, be construed to mean anything else than what they were intended for by the writer of the prescription.

We may assert, as an axiom, that no abbreviation is correct in a prescription which would not allow us to recognize the word if it stood alone, even though the context may enable us to guess what the word should be. Such an abbreviation as *hydr. chlor. cor.* could not well mean anything but corrosive chloride of mercury, and yet all three of these abbreviations are improper, because none of them could be recognized if standing alone. *Hyd. chl.* or *hydr. chlor.*, of course, are worse still, because here the context will not allow us to guess whether hydrate of chloral or one of the chlorides of mercury is wanted.

The rules which apply in English for dividing a word when part of it is at the end of one line and part at the beginning of the next line apply in Latin as well, and an abbreviation should usually be made by simply dropping the terminal syllable.

A rule for abbreviating may be stated as follows:

Ascertain the root of the word and then abbreviate by dropping all letters after the last consonant in the root and place a period after this abbreviation.

Thus, the root of the word *bismuthum* is *bismuth*, and the last consonant is *h*; we therefore place a period after this letter and have the abbreviation *bismuth.*, which is, of course, just as plain as if we wrote *bismuthi* out in full. The root of the word *potassium* is *potassi*, the last consonant of which is the second *s*, at which we abbreviate, and after which we place the period, thus obtaining *potass.* as the abbreviation. This rule, however, requires a knowledge of the declension of

words, especially those of the third declension, and a merely mechanical rule may be used to accommodate those who do not know and do not care to learn the method of ascertaining the roots of Latin words. Such a rule might be stated as follows:

From the words of the official or officinal names drop the endings so that the last letter retained is a consonant which immediately precedes a vowel. Place a period after this consonant.

As an illustration take the official name *hydrargyri iodidum viride*; dropping *i* and retaining as last letter the *r*, which is a consonant immediately preceding a vowel, we have *hydrargyr.* as the abbreviation. Abbreviating further by dropping *r*, we must also drop *y*, so that *g* is the last letter, as this is the next consonant immediately preceding a vowel, and our abbreviation is *hydrarg.*, which is as short as we ought to abbreviate, because the next abbreviation would be *hydr.*, and this would not necessarily mean mercury if it stood alone. According to the same rule *iodidum* is abbreviated to *iodid.*, and *viride* to *virid.*, and our abbreviation for the whole title would be *hydrarg. iodid. virid.*

The above rule being merely mechanical, is not quite sufficient in all cases. A few words are so short that they can not be intelligibly abbreviated at all, as *rheum*, *opium*, *cera*, and some others. Fortunately most of these short words are of either the first or second declensions, and it is easy to write their genitives. A few, however, like *pix*, *calx*, etc., are of the third declension, and here we must learn the genitives or transgress against the rules of Latin grammar and be content to write the nominative; or we change the final *x* to *c* and place a period after it when we have the abbreviation of the genitive, thus: *Pic.* is an abbreviation of *picis*; *calc.*, of *calcis*. But here again we stumble over the difficulty that in some words the vowel preceding final *x* is changed in the genitive, as in *cortex* and *rumex*, of which the genitives are *corticis* and *rumicis*; etc. There are still other words to which this mechanical rule will not apply, as *aloë*, genitive *aloës*; *adeps*, genitive *adipis*; etc.

The only way, therefore, of correctly abbreviating in all cases is to study Latin sufficiently to be able to also correctly write out the names in full, for, according to any other plan, incorrect abbreviations will occasionally creep in.

By long-established custom some incorrect abbreviations may be tolerated, as when we write *sulph.*, which always means *sulphas*, or sulphate. It is true that it might be an abbreviation of *sulphis*, *sulphidum*, etc., but by usage the whole world over *sulph.* means the sulphate, and the other words must be distinguished by writing out in full, or, at least, by a different abbreviation. A common error is to abbreviate *sulphas*, or *sulphatis*, to *sul.* This is always inelegant and

wrong. Such abbreviations as *sulp.* for *sulph.*, *phosp.* for *phosph.*, are also quite common; and in regard to them it should be remembered that *ph* in these words represents one sound—the sound of *f*. It does not, therefore, represent two letters, but only one, and can not be separated in this class of words.

It is not possible to mention all the inelegant or incorrect abbreviations in common use, such as *pot.* for *potassium*; *hg.*, *hyd.*, and *hydr.* for *hydrargyrum*; *cp.* and *co.* for *compositus*, etc., for they are legion.

Some of these, it is true, have the sanction of long usage in their favor and should, perhaps, not be called wrong on that account; such are, for instance: *co.* or *cp.* for *compositus*; *fl.* or *fld.* for *fluidus*; *plv.* for *pulvis*; *spl.* for *simplex*; *sp.*, *spt.*, or *spts.* for *spiritus*; *tr.* for *tinctura*; and *ugt.* or *ungt.* for *unguentum*, etc.

The extremes of brevity to which abbreviations are sometimes carried may be seen from the following, which are a very few of those quoted as proper in a well-known medical work.*

<i>C. C.</i>	<i>Cucurbitula cruenta</i> (cupping glass).
<i>C. C.</i>	<i>Cornu cervi</i> (hart's horn).
<i>C. C. U.</i>	<i>Cornu cervi ustum</i> (burnt hart's horn).
<i>O. O. O.</i>	<i>Oleum olivæ optimum</i> (best olive oil).
<i>P. R. N.</i>	<i>Pro re nata</i> (according to circumstances).
<i>Q. Q. H.</i>	<i>Quaqua quarta hora</i> (every four hours).
<i>Q. P.</i>	<i>Quantum placet</i> (as much as you please).
<i>T. O.</i>	<i>Tinctura opii</i> (tincture of opium).

To use such abbreviations, especially when they refer to such powerful preparations as opium tincture, is to trifle with human life, and if an accident occurred in consequence it should be ascribed to criminal carelessness.

A peculiar method of abbreviation is used in some parts of Europe. It is to contract the word to its most important consonants and end with the proper vowel endings, so that *tinctura* (nominative) is changed to *Tra*, and *tincture* (genitive) to *Trae*. No period is placed after these abbreviations, and unless known the names might appear strange. For instance:

R—Trae nuc. vomic., f ʒ i.
 Trae cinchon. comp., f ʒ vii.
 M. S.: 5 drops three × daily.

The arithmetical multiplication sign, ×, meaning "times," is often used in signatures, as above.

The main rule in abbreviating should be to write an intelligible prescription. Grammatical correctness or elegance are subordinate considerations. An error in a prescription which merely annoys a Latin

* Thomas' Medical Dictionary.

scholar is absolutely insignificant when compared with an error which may lead to the dispensing of the wrong medicine.

The first requisite in writing prescriptions should be to know the correct Latin official or officinal titles and to use only them. If we could be sure that this was always done it would sometimes help us when in doubt about the reading. For instance: *Hydr. chlor.* could not then stand for chloral, because the official name is merely *chloral*. But when both words are used in Latin it would be *chloral hydras* (Br.) or *chloral hydratum* (G.), and the abbreviation would be *chlor. hydr.*, instead of *hydr. chlor.*, the latter meaning mercuric or mercurous chloride. Of course, all these abbreviations would be wrong, but the point is that the sequence of such wrong abbreviations may occasionally enable us to decipher them in doubtful cases.

LATIN PHRASES.

Formerly the subscriptions of prescriptions were written out in Latin at great length, as in the following example copied from the United States Dispensatory, where it is to be found under the title "Examples of Common Extemporaneous Prescriptions:"

R—Olei ricini,	f ʒ iss.
Tincturæ opii,	℥ xxx.
Pulveris acaciæ,	
Sacchari, aa	ʒ ii.
Aquæ menthæ viridis,	f ʒ iv.

Acaciam et saccharum cum paululo aquæ menthæ tere; dein oleum adjice, et iterum tere; denique aquam reliquam paulatim infunde, et omnia misce. S.: A tablespoonful to be taken every hour till it operates.

The introduction of the use of such complicated subscriptions possibly dates back to a time when physicians dispensed their own medicines, or, rather, had them dispensed by the young men who "read" medicine in their offices, and who were by no means competent pharmacists. Now, as a rule, druggists know better than physicians how to dispense a prescription, and such detailed directions in a subscription would be, to say the least, superfluous. They are, therefore, obsolete, except in England, where old habits seem to be adhered to with great pertinacity. The signatures are also written in Latin by some English authors, although by none others in the world, and to enable our readers to understand the most common of the phrases that they may meet with in English works, or in some English works "adapted to the United States Pharmacopœia," we publish first a few examples of the signatures themselves, and then a list of the more common phrases.

In this country it is the rule and custom to write very simple subscriptions and English signatures, and, therefore, the following lists are of comparatively little use here.

Examples of Latin Signatures (Obsolete in the United States).

<i>Fiat mistura, cujus detur cochleare magnum omni bihorio.</i>	Let a mixture be made, of which a tablespoonful may be given every two hours.
<i>Fiat mistura. Hujus sumatur cochleare medium omni trihorio.</i>	Let a mixture be made. Of this a dessertspoonful may be taken every three hours.
<i>Harum pilularum una sumatur omni nocte.</i>	Of these pills let one be taken every night.
<i>Hujus sumatur poculum omni trihorio.</i>	Of this let a cupful be taken every three hours.
<i>Capiat cochleare minimum omni hora.</i>	Let him (the patient) take a tablespoonful every hour.

Examples of Words and Phrases (Obsolete in the United States).

Latin.	English.
<i>Absente febre</i>	fever being absent.
<i>Ad defectionem animi</i>	to fainting.
<i>Ad deliquium</i>	to fainting.
<i>Ad duas vices</i>	at twice taking.
<i>Ad libitum</i>	at pleasure.
<i>Ad pondus omnium</i>	to the weight of the whole.
<i>Admove</i>	apply.
<i>Astante febre</i> ..	fever being present.
<i>Alternis horis</i>	every other hour.
<i>Alvo adstricta</i>	the bowels being constipated.
<i>Ana</i>	of each.
<i>Biduum</i>	space of two days.
<i>Bihorium</i>	during two hours.
<i>Bis in die</i>	twice a day.
<i>Bulliat</i>	let it boil.
<i>Capiat</i>	let him take.
<i>Cochleare magnum</i>	tablespoonful
<i>Cochleare medium</i>	dessertspoonful.
<i>Cochleare minimum</i>	teaspoonful.
<i>Cochleatim</i>	by spoonfuls.
<i>Cras mane</i>	to-morrow morning.
<i>Cras nocte</i>	to-morrow evening.
<i>Cujus</i>	of which.
<i>Cujuslibet</i>	of which you please.
<i>De die in diem</i>	from day to day.
<i>Deaurentur pilulæ</i>	let the pills be gilded
<i>Debitæ spissitudinis</i>	of a due consistence.

<i>Decanta</i>	decant; pour off.
<i>Decubitu</i>	on going to bed.
<i>Digeratur</i>	let it be digested.
<i>Diluculo</i>	at daybreak.
<i>Dum febris absit</i>	while fever is absent.
<i>Dum febris adsit</i>	while fever is present.
<i>Durante febre</i>	during fever.
<i>Extende supra</i>	spread upon.
<i>Febre durante</i>	during fever.
<i>Gelatina quaris</i>	in any kind of jelly.
<i>Guttatim</i>	drop by drop
<i>Guttis quibusdam</i>	with a few drops.
<i>Harum pilularum sumantur tres</i>	let three of these pills be taken.
<i>Hora</i>	hour.
<i>Hora decubitus</i>	at bedtime.
<i>Hora somni</i>	at bedtime.
<i>Horæ unius spatuis</i>	in one hour.
<i>Horis alternis</i>	every other hour.
<i>In dies</i>	daily.
<i>In pulmento</i>	in gruel.
<i>Injiciatur enema</i>	let a clyster be given.
<i>Lateri dolenti</i>	to the affected side.
<i>Mane</i>	in the morning.
<i>Mane primo</i>	in the early morning.
<i>Manipulus</i>	a handful.
<i>Mittatur sanguis</i>	let blood be drawn.
<i>More dictu</i>	as directed.
<i>More solitu</i>	in the usual manner.
<i>Nocte</i>	at night.
<i>Nocte manequæ</i>	at night and in the morning.
<i>Omni biduo</i>	every two days.
<i>Omni bihorio</i>	every two hours.
<i>Omni hora</i>	every hour.
<i>Omni mane</i>	every morning.
<i>Omni nocte</i>	every evening.
<i>Omni quadrante hora</i>	every quarter of an hour.
<i>Omnibus alternis horis</i>	every other hour.
<i>Partitis vicibus</i>	in divided doses.
<i>Peracta operatione emetici</i>	when the emetic has acted.
<i>Post cibo</i>	after eating.
<i>Post singulas sedes liquidas</i>	after every loose stool.
<i>Pro ratione</i>	in proportion to.
<i>Pro ratione ætatis</i>	according to age.
<i>Pro re nata</i>	according to circumstances.

<i>Pugillus</i>	a handful.
<i>Quantum placet</i>	as much as you please.
<i>Quantum satis</i>	enough.
<i>Quantum sufficit</i>	as much as suffices.
<i>Quantum vis</i>	as much as you will.
<i>Quaqua hora</i>	each hour; hourly.
<i>Quaqua quarta hora</i>	every four hours.
<i>Quater in die</i>	four times a day.
<i>Quorum</i>	of which.
<i>Quotidie</i>	daily.
<i>Secundum artem</i>	according to art.
<i>Secundum artis leges</i>	according to the rules of the art.
<i>Semihora</i>	half an hour.
<i>Sequenti luce</i>	the following day.
<i>Sesquihora</i>	an hour and a half.
<i>Si opus sit</i>	if there is occasion.
<i>Si vires permittant</i>	if the strength will permit.
<i>Statim</i>	immediately.
<i>Subinde</i>	now and then.
<i>Ter indie</i>	three times a day.
<i>Tere simul</i>	rub together.
<i>Vitello ovi solutus</i>	dissolved in yolk of egg.

Some of these phrases are occasionally abbreviated almost beyond recognition, as seen in the examples we quoted above, but even when thus abbreviated our readers will have but little difficulty in recognizing them.

PART IV.

EXTEMPORANEOUS PRESCRIPTIONS.

PRELIMINARY CONSIDERATIONS.

We have already learned that prescriptions are divided into two classes, *permanent* and *extemporaneous*, and have also learned that these differ not so much in their form, or in the character of the resulting preparations, but rather in the manner in which, and according to the circumstances under which, they are written. We desire to impress this fact clearly on the mind of the reader, especially as some writers have given entirely erroneous ideas on this subject.

The permanent prescriptions are formulæ which are kept permanently on record in books of reference, as, for instance, the pharmacopœial formulæ for tinctures, wines, pills, etc. The keeping quality of the products has nothing to do with the definition of a permanent prescription, although we have seen the definition that a permanent prescription is one which, when compounded, will yield a permanent preparation. So far is this from true that some of the most ephemeral of preparations—infusions—are made according to permanent prescriptions.

On the other hand, an extemporaneous prescription, when compounded, may give products having great keeping qualities, as when we prescribe pills or mixtures of tinctures which will keep for an indefinite length of time.

The word extemporaneous is from the Latin *ex tempore*—literally, out of the time—and means proceeding from the impulse of the moment, unpremeditated, off-hand. This meaning sufficiently characterizes the nature of extemporaneous prescriptions. They are written by the physician to meet the peculiar requirements of an individual patient at the time of writing, and may, therefore, call for a combination which would be inappropriate under any other circumstance or at any other time. These prescriptions are also called *magistral* prescriptions (from the Latin *magister*, master), because they are arbitrarily or dogmatically written on the judgment of an individual whose authority in this matter admits of no dispute. Formerly the word magistral was also used as a synonym for sovereign or excellent, and a magistral remedy meant a sovereign remedy.

The term prescription is often understood by the public to mean the piece of paper given them by the physician, with all that is written thereon. In this sense we will now consider it.

PRESCRIPTION BLANKS.

It is customary for the physician to carry with him prescription blanks, with the address of some pharmacist printed on the back of them. When the physician uses these blanks it is generally understood by the public to mean that they must go to the drug store designated on the back to get their medicines. The physician should, therefore, use the blanks of such druggists only as he believes to be thoroughly competent. It is not necessary again to dwell on this matter, as the views of the writer are fully set forth in the earlier part of these pages under the head, "Specifying in Prescriptions." *

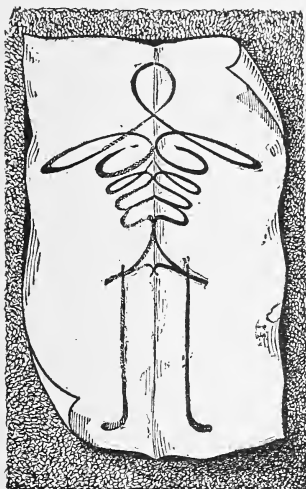
Many physicians prefer to use their own blanks without any druggist's address on them, and this is preferable when the physician makes visits at long distances from his home. He can then designate verbally to which drug store in the neighborhood of the patient's home the prescription is to be taken for compounding.

WRITING.

But whether the physician uses his own or some pharmacist's blank, this piece of paper should be sized so as to be fit for pen-and-ink writing. To rely on any chance supply at the house of the patient, odd bits of wrapping paper, the inside of old envelopes, leaves torn from memorandum books, etc., denotes slovenliness and carelessness on the part of the prescription writer, and the public is led to think that he writes so few prescriptions that he doesn't find it worth while to carry paper with him. It is one of the many minute influences in regard to which attention or neglect contributes in some subtle manner to success or failure in practice. These blanks should, therefore, be of good paper, well and smoothly kept in a pocket-book, or in blocks, and especially should they be kept clean. The writing on them should be as plain as can be, not in lead-pencil, but in ink, which is quite feasible in these days of fountain pens. Lead-pencil marks often become blurred and almost illegible by the handling they receive before they are presented for compounding. The poor penmanship of some physicians only too clearly betrays their want of general education, and is another of those small influences which, perhaps, amount to little in themselves, yet exert such great influence in the aggregate in making or marring one's career. To affect

* See page 30.

an eccentric, peculiar, and illegible chirography, under the mistaken idea that a poor handwriting will be considered an evidence of genius, is a form of quackery unworthy of the educated physician. When the



writing is in ink, the paper should not be folded until it is perfectly dry, to avoid blurring and consequent possible mistakes.

The dissecting-room joke of drawing a skeleton is probably familiar to all; by folding a piece of paper so as to form a crease, then writing along one side of the crease the word "cent" with a long stroke through the "t," and folding again so as to produce a reversed impression on the opposite side of the crease, the crude figure of a skeleton may be produced. A similar effect in a prescription may transform 3 into 3̄, or IV, V, VI, VII, or VIII into IX, X, XI, XII, or XIII, or it may so blur the entire prescription as to make it utterly illegible.

When the writing is dry, the paper is ready to be delivered to the patient. If the physician can conveniently do so, he may put the prescription into an envelope before giving it to the patient. This prevents the soiling and tearing of the prescription, and, by keeping it clean and legible, acts to some extent as a safeguard against mistakes.

Besides the prescription proper, or the directions for compounding the medicines, a number of other things are written on the blank.

THE DATE.

The first thing should be the date. This is usually written at the head of the blank. The best method is to write the name of the month, either in full or abbreviated, then the number of the day, and then the year, thus: Sept. 27, '86. The number for the year is generally abbreviated by omitting the number of the century, simply writing 86, preceded by an apostrophe, as in the above line. Some prefer to write the number of the month instead of writing the name. This often gives rise to confusion if Arabic numerals are used, because there is no uniform rule as to whether the number of the month or the number of the day shall be written first. Some would write the sixth day of September, 6.9.'86; some would write it 9.6.'86; others

write it in the style of a fraction, 6/9.'86, or 9/6.'86. When the number of the day is 13 or more, of course no mistake can occur, but in the illustrations given above no one could positively say whether the ninth day of the sixth month or the sixth day of the ninth month was meant by the writer, unless he was acquainted with the physician's habit in this regard.

We should, therefore, always write the number of the month in Roman numerals, and the number of the day in Arabic numerals, when it will, of course, make no difference which is written first, for 6.IX.'86 or IX.6.'86 will be equally intelligible.

NAME OF THE PATIENT.

Then there should follow on the blank a line for the name of the patient, thus:

For.....

The prescriber should not neglect to insert the name of the person for whom the medicine is intended, because it is a safeguard against mistake. The druggist is less liable to deliver the medicine to the wrong party, and at the home of the patient there is less likelihood of the administration of the medicine to the wrong member of the household.

CHARITY PATIENTS.

If the patient is poor and unable to pay full price for his medicines, the physician may write the letter "P" on the prescription after the name, which means the patient is poor (the letter stands for the Latin word *pauper*, poor). If the patient is unable to pay anything at all, the letters "P P" (*pauperrimus*, very poor) will convey the information to the druggist. Of course, the physician ought not to use these signs unless he himself is also serving in the case gratuitously, as it would be unfair for him to collect his fees and then send the patient to become a tax on the charity of the pharmacist; nor should unnecessarily expensive medicines be ordered for charity patients.

PRESCRIPTIONS FOR EMERGENCY CASES.

In an emergency case it may be necessary to have the medicine dispensed in a hurry, and this may be indicated in the prescription by the words *cito* (quick), or *citissime* (very quick, or quickest), and the prescription will have precedence over everything else, but the prescription should be as simple as possible, so as to be easily and quickly put

up. Prescriptions for infusions, decoctions, and other time-consuming preparations would be out of place. So, also, would prescriptions for pills, capsules, and other slow-acting forms of remedies be inappropriate for emergency cases, in which fluid preparations will be found to act most promptly.

The above words, if used at all, are written at the head of the prescription blank so as to attract attention at once.

PHYSICIAN'S ADDRESS.

Then follows the prescription proper, which we will consider hereafter, and after it should come the full name of the physician—if possible, in plain print—together with his full address and his office hours, which latter may be of importance in case the physician should make an error in his prescription, which would require the pharmacist to consult him before putting up the medicine.

ABOUT REPETITIONS.

Some physicians have recently commenced the practice of writing immediately after the *signatura* of the prescription the words, "not to be repeated." It is doubtful whether this direction can be obeyed by the pharmacist, and it is probably superfluous and useless. When this direction is on the blank, the patient will generally demand that his prescription shall be returned to him, and no druggist would hesitate to put it up without asking whether it had been previously compounded or not, and many pharmacists will pay no attention to any such directions. The question of ownership in the prescription is a very vexing one, and while the writer inclines to the belief that the prescription belongs to the patient who has paid for it, there are others who claim it to be the property of the physician, and some who believe it to become the property of the pharmacist who compounds it. The question is not likely ever to be satisfactorily settled, and, therefore, it is not necessary to say more about it than that it will be of little or no use to write "not to be repeated."

THE PRESCRIPTION.

From time immemorial it has been considered to be the aim of the physician to cure rapidly, safely, and pleasantly (*curare cito, tuto, et jucunde*), and the modern prescription is written with these aims in view. To accomplish these objects, a complete compound prescrip-

tion contains several parts which have received various names from different writers. All writers agree in adopting this scheme:

<i>Superscriptio</i>	superscription.
<i>Inscriptio</i>	} inscription.
<i>seu</i>	
<i>Designatio materiæ</i>	
<i>seu</i>	
<i>Præscriptum proprium</i>	
<i>seu</i>	
<i>Præscriptio propria</i>	
<i>Subscriptio</i>	subscription.
<i>Signatura</i>	signature.

The superscription (*superscriptio*, *onis*, f., from the Latin *super*, above, and *scriptio*, *onis*, f., writing), at the present time consists, in a Latin prescription, of the letter R or the sign \mathfrak{R} . In an English prescription it is customary to write "take of," while the French usually write P. (abbreviation for *prenez*, take), and the Germans begin with "*Man nehme*," or "*nimm*" (take).

The letter R in the Latin prescription is an abbreviation from *recipe* (imperative of the verb *recipio*, 3, to take), and means "take." The sign \mathfrak{R} , however, has a different origin. In ancient times it was customary to invoke the blessing of the deity on the remedies to be taken by a formal prayer at the beginning of the prescription, and, with the usual attempt of the physicians to abbreviate as much as possible, these invocations finally dwindled down to merely naming the deity addressed, and, later, to write, instead of the names, the signs used to designate them. Thus the aid of Mercury, the god of merchants and thieves, was invoked by using the sign \mathfrak{Q} as a superscription; the aid of Venus, goddess of love, beauty, and pleasure, by using the sign \mathfrak{V} (rude representation of a hand-mirror); or the aid of Jupiter, the supreme god and father of gods, by using the symbol \mathfrak{J} , now also used as a zodiacal sign for the planet Jupiter. This sign survives in the shape of \mathfrak{R} , especially as generally written, being merely furnished with the stroke of the R. In the oldest pharmacopœia known, the Egyptian papyrus from Thebes, already previously referred to, no invocation or superscription was used, but the physician began abruptly with an enumeration of the ingredients of his prescription. The use of these invocations was of a later date and originated among the Greeks and Romans, and continued to the time of the alchemists. At that time the influence of the Church on the minds of men, or perhaps the fear of the Inquisition, led physicians to adopt an invocation to the Christian God, and, just as they abbreviated a prayer to crossing themselves with their fingers over their foreheads and breasts, so they contracted the invocation to the sign

of the cross, †, as a superscription. Sometimes a double cross, ‡, was used, and the writer knew a physician who used this double cross at the head of his prescription blank but a few years ago.

Some used the abbreviation *A Ω* (the Greek letters Alpha and Omega), which referred to God as the beginning and end of all things; or the letters *J. D.* (*Juvante Deo*, God helping), or *J. J.* (*Juvante Jesu*, Jesus helping).

Others used the words *Cum Deo* (with God, or in the name of God), or abbreviated these words to *C. D.*; or the letters *N. D.* (*Nomine Deo*, in the name of God), thus beginning their prescription with the formula even now used by many ministers in opening services on Sunday when they say, "In the name of God, Amen!" (*Im Namen des Herrn, Amen! Lasset uns singen,*" etc.)

In view of this origin of the use of a superscription, it becomes a question of interest whether "*Superscriptio*" should not have been "*Superstitio*." The only trace of all this superstition to be found in the modern prescription is the little appendix to the letter R, as seen in the sign *R̄*.

The inscription (*inscriptio, onis, f.*, from the Latin verb *inscribo, 3*, to write down, to describe, to designate) consists of an enumeration of the medicinal substances which are to be used in compounding the prescription. Either of two plans may be followed in writing this part of the prescription—to enumerate the medicines in a definite order according to their therapeutical importance, or to write them in the order in which the pharmacist takes them for compounding.

The first is the more common plan, because it is the easier. Writers are not all agreed on the best form of this plan, some subdividing the remedies into four, others into five groups. In either case, however, the plan is based on the direction to cure quickly, safely, and pleasantly (*curare cito, tuto, et jucunde*). In fact, the division into four groups, according to therapeutical importance, seems to have been adopted, not so much on account of the relative value of the ingredients as from a desire to adapt the modern prescription more closely to the above classic advice of Asclepiades. We see this in the following plan:

The inscription consists of { base*curare*,
auxiliary.*cito*,
corrective....*tuto*,
vehicle.....*et jucunde*.

The base (*basis, is, f.*) is the most important ingredient of the prescription, on which the main reliance for cure is based. No one remedy, however, always answers all the indications of the case and it may be necessary to add some other ingredient to increase the medicinal effect of the base. This is called an adjuvant or auxiliary (*ad-*

juvans, antis, n., from the verb *adjuvo*, 1, I assist), and is intended to comply with the command to cure *quickly*.

If either the base or adjuvant has objectionable therapeutical properties, a third ingredient, the corrective (*corrigenis, entis*, n., from the verb *corrigo*, 3, I improve) is added, which complies with the demand to cure *safely*. Lastly comes the vehicle (*vehiculum, i*, n., also formerly called *constituens*), in which the other ingredients are dissolved and conveyed to the patient, and which usually consists of flavoring tinctures, syrups, simple elixir, sugar, water, etc. It fulfills the command to cure *pleasantly*.

Another, slightly different and preferable, method of subdividing the inscription is as follows:

The inscription consists of	{	base.....	<i>curare,</i>	
		adjuvant...	<i>cito,</i>	
		corrective..	<i>tuto,</i>	
		excipient,	}	<i>et jucunde.</i>
		diluent,		

The base, adjuvant, and corrective are as above, but, instead of a vehicle, there are two divisions: the excipient (*excipiens, entis*, n.), which is added for the purpose of correcting objectionable organoleptic properties (taste and smell), or to give a desirable consistence, as when a syrup or mucilage is added to a mixture to prevent a suspended powder from subsiding too rapidly; and a diluent (*diluens, entis*, n.), consisting of some medicinally inert substance, which is used to dilute the more active ingredients, either because it is physically impossible otherwise to divide the medicines into proper doses, or because it is undesirable to give the remedies in a concentrated form, or because the addition of the diluent allows us to adjust the doses for the use of one of the ordinary household approximate measures, as the teaspoon or tablespoon. The corrective is also sometimes called a directive, as will be explained further on; and in prescriptions for troches, pills, suppositories, etc., a conspergative (*conspergens, entis*, n., from the verb *conspergo*, 3, to strew or sprinkle) is not infrequently employed. We may have, therefore, the following ingredients in a prescription: base, adjuvant or auxiliary, corrective or directive, excipient, diluent, and conspergative, following each other in the order named.

Instead of following each other in the above order, these different parts of the prescription may be written in the order in which they are added to each other in compounding; but as this must vary according to the nature of the medicine to be dispensed, it requires a knowledge of pharmacy to write a prescription in this manner, and no rule can be given, but the method can only be illustrated by an example. The following prescription, from the "Companion to the United

States Pharmacopœia," illustrates this method sufficiently well, the parts being designated on the right in parentheses :

R—Amygdalæ olei dulcis,	f ʒ vi	(<i>adjutant</i>).
Acaciæ pulveris,		(<i>excipient</i>),
Aquæ, ana quantum satis		(<i>diluent</i>)
ut fiant emulsionis	f ʒ iii.	
Adde		
Opii tincturæ,	f ʒ i	(<i>base</i>).
Bismuthi subcarbonatis,	ʒ i	(<i>adjutant</i>).
Sacchari syrupi,	f ʒ i	(<i>excipient</i>).
Misce. Signa:.....		

When the prescriber is familiar with the manner of compounding, this method of prescribing is very convenient, and preferable to the mere enumeration of the different parts of the prescription in a certain fixed sequence, but the latter plan is better when the physician is not familiar with pharmaceutical manipulations.

The next part of the prescription is the subscription (*scriptio, onis, f.*, from *sub*, under, and *scriptio*, writing), which is the direction to the pharmacist how to compound. This was formerly quite complicated, but is now exceedingly simple, often being contracted to the letter M only (*misce, mix*). The subscription needs no further mention now, but will be considered again further on.

Then follows the signature (*signatura, æ, f.*, the mark), which is the direction to the patient how to use the medicine, which is to be marked on the label by the dispenser. This should always be in the plain vernacular language, and should be put on the label with the same care and completeness as the different ingredients are put into the medicine to be dispensed. When the physician gives complete directions in the signature, and the druggist substitutes for them on the label the words, "to be used as directed," he is morally as responsible for an error or accident occurring in consequence as if he had substituted morphine for quinine.

This concludes the prescription proper, after which, as already stated, should follow the full name and address of the physician, when the whole prescription is done.

We will now consider the parts of the inscription somewhat more fully.

THE BASE.

When the physician has made his diagnosis, he determines what remedy will meet most of the indications of the case, and writes it down after the *R*. This remedy being the most important, is *to cure (curare)*, and is the *base* of the prescription. It is often the only ingredient, as when we prescribe tincture of muriate of iron, or solution of citrate of magnesium, or any single preparation, as in the following examples :

R—Tincturæ ferri chloridi, f ʒ i.

Signa: 20 drops three × daily.

Or:

R—Pilulas ferri iodidi, XXIV.

Signa: 1 pill morning and evening.

When the base is sufficient to meet all the requirements of the case therapeutically, and is in such a shape that it can be administered without the addition of any other substance, it is, of course, unnecessary to add anything further. Paris, in his "Pharmacologia," says on this subject:

"Let it be distinctly and unequivocally understood that, unless a physician can satisfactorily explain the operation of each element in his prescription, * * * *simplicity* should ever be regarded as the greatest desideratum; * * * he may be assured that, unless he be well acquainted with the mutual actions which bodies exert upon each other and upon the living system, it may be laid down as an axiom that, *in proportion as he complicates a medicine, he does but multiply the chances of its failure.* Let him cherish this maxim in his remembrance, and in forming compounds always discard from them every element which has not its mode of action clearly defined, unless, indeed, a general and paramount experience shall have stamped upon it the authentic seal of approval.

"There is this marked distinction between the raw and well-disciplined practitioner, that while the one, seeing only a variety of unconnected symptoms, seeks to attack each by a separate ingredient in his prescription, the other, by being enabled to group together such as arise from a single cause, diminishes in number and variety the points to be attacked, and simplifies his remedies in the same ratio.

"The perfection of a medicinal prescription may be defined by three words. It should be **PRECISE** (in its *directions*), **CONCISE** (in its *construction*), **DECISIVE** (in its plan of *operation*). It should carry upon its very face an air of energy and decision, and speak intelligibly the indications which it is intended to fulfill. It may be laid down as a maxim, which is not in much danger of being controverted, that *where the intention of a medicinal combination is obscure, its operation will be imbecile.*"

ADJUVANT.

Bearing in mind, then, the undesirability of adding unnecessarily to the base, there may yet be occasions when we can improve its action by the addition of another drug and thus accelerate the cure, as when we add senna to epsom salts in the popular "senna and salts." This second ingredient is to cure *quickly (cito)*, and is called the *adjuvant* (which means assistant).

Examples of adjuvants in prescriptions are quite common. Cathartics are often given in combination, assisting each other in action. It is very common to combine tonics, as when vegetable bitters are combined with iron; and vegetable alteratives are commonly added to the mercurials for specific diseases.

If we combine two or more substances essentially similar in action—as, for instance, two cathartics, diuretics, etc.—the combination will act more promptly and effectually than either one of the drugs alone. In such combinations the dose of each drug is proportionately less than if it were given without the other.

In the following prescription we combine the tonic effects of quinine and iron, thus:

R—Quininae sulphatis,	gr. xx.
Acidi citrici,	q. s.
Ferri et ammonii citratis,	ʒ i.
Sacchari syrupi,	f ʒ i.
Aquæ puræ,	f ʒ v.
Misce. Fiat solutio. Signa:.....	

Quinine may be considered as the base, iron as the adjuvant, citric acid as an excipient to dissolve, and syrup to improve the taste; while, lastly, water is a diluent for ease of administration and simple solution.

R—Opii pulveris,	gr. iv.
Hyoscyami extracti,	
Conii extracti, āā,	gr. xii.
Misce et divide in pilulas XII.	
Signa: 1 pill at bedtime.	

In this prescription several narcotics are combined, and in this form will frequently act better than when one alone is given. Opium, of course, is the base, and the other ingredients are adjuvants. As these are soft, no special excipient is needed in this case to make a pill mass.

An adjuvant need not necessarily be a drug having a therapeutical effect similar to the base, but may belong to quite a different class of the materia medica, provided, of course, that the actions of the base and adjuvant will not interfere.

A diuretic with a diaphoretic would not be a suitable combination, because the two secretions antagonize, or at least complement each other; diuresis being diminished when diaphoresis is increased, and *vice versa*.

A powerful adjuvant in all cases, though not expressed in the prescription, is the diet we prescribe for our patients. It would be absurd to give "slop diet" with tonics, or beef tea and milk punch with antiphlogistics.

Occasionally in febrile cases the pulse is full and hard, and the pressure within the vessels such that absorption can not take place

readily. In such cases we may combine with our remedies a small quantity of some sedative or depressing agent, which will relax the system and, therefore, favor absorption. In the following prescription we have added for this purpose a small quantity of tartar emetic:

R—Magnesii sulphatis, $\frac{3}{4}$ i.
 Potassii et antimonii tartratis, gr. i.
 Syrupi acidi citrici, $f\frac{3}{4}$ i.
 Aquæ puræ, q. s. ut fiant solutionis, $f\frac{3}{4}$ iv.
 Misce. Signa:.....

Tartar emetic, or veratrum viride, may frequently be added to cathartics, diaphoretics, and, in fact, to all eccritics or eliminatives.

Either of these remedies might also be given separately, as when we give tartar emetic to produce vomiting before administering quinine, for instance. The act of vomiting relaxes the system and the remedy will be absorbed more readily, so that in effect, if not in name, the tartar emetic would be an adjuvant to the quinine. Some of our "old-fashioned" practitioners are in the habit of commencing all their treatments with an emetic (or with a cathartic, which acts similarly, though weaker). It is probable that this treatment is a little too much neglected and undervalued at present, and that emetics deserve more frequent employment; of course, it must not be a mere matter of routine to give them, but they must be indicated.

The following familiar formulæ for pills show the use of adjuvants:

Antibilious Pills (Vegetable).

Extr. colocynth. comp., $2\frac{1}{2}$ grs.
 Resin. podophyll., $\frac{1}{4}$ gr. (*adjuvant*).
 Dose: 1 to 4 pills

Alterative Pills.

Extr. colocynth. comp., $1\frac{1}{2}$ grs.
 Pulv. rhei, $1\frac{1}{2}$ grs. (*adjuvant*).
 Pil. hydrarg., 1 gr. (*adjuvant*).
 Ol. carui, $\frac{1}{40}$ drop.
 Dose: 1 to 3 pills.

In the following "shot-gun prescription" it would be difficult to say which ingredient is the base, unless we simply assume the first mentioned to be such, although all are of about equal value.

Neuralgic Pills (Brown-Sequard's).

Extr. hyosecyami, $\frac{2}{3}$ gr.
 Extr. conii, $\frac{2}{3}$ gr.
 Extr. ignat. amar., $\frac{1}{2}$ gr.
 Extr. opii, $\frac{1}{2}$ gr.
 Extr. aconiti fol., $\frac{1}{3}$ gr.
 Extr. cannab. Indic., $\frac{1}{4}$ gr.
 Extr. stramon., $\frac{1}{5}$ gr.
 Extr. belladonn. fol., $\frac{1}{6}$ gr.
 Dose: 1 pill.

This might properly be said to be "all adjuvants." Experience occasionally teaches the value of such combinations, but as a rule we do better to avoid them.

CORRECTIVE, OR DIRECTIVE.

Occasionally either one or both of the above-described ingredients of a prescription possess some disagreeable physiological or therapeutical effects, such as irritating, pungent taste, or a tendency to cause griping or nausea, etc., and we find it necessary to add a third ingredient to overcome such objectionable features. This ingredient is to cure *safely* (*tuto*), and is called the *corrective*. Sometimes it is also called *directive*; for instance, when turpentine is given in a tablespoonful dose to expel lumbrici, it occasionally fails to act on the bowels, but acts on the kidneys, in which unfortunate event it may produce serious injury, such as strangury, or even hæmaturia. We can *correct* this tendency to act on the kidneys by *directing* the action of the turpentine to the bowels by adding castor oil. Spigelia may be given for the same object as turpentine, and usually purges; if it fails to purge, it will act as a narcotic poison. We can *correct* the tendency to act as a poison by *directing* its action to the bowels by adding senna, whence the popular "pink root and senna" combination.

Some authorities have erroneously said that the adjuvant is sometimes called a directive, but a careful analysis of the action of this ingredient will show that in almost all cases in which a directive action is obtained it is for the purpose of correcting a tendency to produce undesirable effects, and, therefore, that a directive is always a corrective, although a corrective is by no means always a directive.

The corrective is less frequently employed than any of the other ingredients of the prescription, although when indicated it is quite an important part of the prescription.

R—Cantharidis tincturæ, fʒ i.
 Amygdalæ misturæ, fʒ iii.
 M. S.: Dessertspoonful four times daily.

In this prescription for chronic gleet the irritant properties of the cantharides are completely disguised by the demulcent almond emulsion, which acts both as corrective and as a diluent.

R—Hydrargyri chloridi mitis, gr. viii.
 Opii pulveris, gr. i.
 Sacchari pulveris, ʒ ss.
 Misce et divide in pulveres VIII.

Such a combination of opium with calomel is frequently employed when the mercurial is given in syphilis, and we desire to correct its

tendency to purge, or to direct its action so as to produce constitutional effects.

Compound Cathartic Pills (Improved).

Extr. colocynth. comp.,	1½ grs.
Extr. jalap.,	1/8 gr.
Resin. podophyll.,	1/8 gr.
Resin. leptandræ,	3/8 gr.
Extr. hyoscyami,	1/4 gr. (corrective).
Extr. gentianæ,	1/2 gr.
Ol. menth. pip.,	1/40 drop.

Dose: 1 to 3 pills.

Mandrake Pills (Dr. E. R. Squibbs').

Resin. podophyll.,	1/4 gr.
Extr. belladonn. fol.,	1/8 gr. (corrective).
Capsici pulv.,	1/2 gr.

Dose: 1 or 2 pills.

Calomel and Rhubarb Pills.

Hydrarg. chlorid. mit.,	1/2 gr.
Extr. rhei,	1/2 gr.
Extr. colocynth. comp.,	1/2 gr.
Extr. hyoscyami,	1/6 gr. (corrective).

Dose: 1 to 3 pills.

Aloes and Iron Pills.

Pulv. aloes socotr.,	1/2 gr.
Extr. conii,	1/2 gr. (corrective).
Ferri sulph. exsicc.,	1 gr.
Pulv. zingib. Jamaic.,	1 gr.

Dose: 1 to 3 pills.

Aloes and Myrrh Pills (U. S. P.).

Pulv. aloes socotr.,	2 grs.
Pulv. myrrh.,	1 gr.
Pulv. aromat.,	1/2 gr. (corrective).

Dose: 3 to 6 pills.

Probably the best known examples of prescriptions containing a corrective can be seen in the many popular formulæ for laxative pills, in which extracts of belladonna, hyoscyamus, or conium are used to correct the tendency of the cathartic ingredients to produce griping. These extracts are preferred to opium and similar narcotics, because they do not produce constipation, but rather promote the vermicular action of the intestines.

EXCIPIENT.

The next ingredient in the prescription is the *excipient*, to cure pleasantly (*juvunde*). This may be added for the purpose of giving a certain consistence to the medicine, as when we add syrup or mucilage to a mixture to prevent a too rapid subsidence of the insoluble

particles; or when we add acacia to emulsify an oil; or an adhesive substance to powders to make a pill mass. The excipient is also added for the purpose of rendering the preparation pleasant to the patient, as when we add aromatics, syrups, etc., to disguise the unpleasant taste of many of our remedies, or for improving the smell or appearance.

Much of the success of homœopathy has been due to the pleasantness of its remedies, and a careful attention to rendering the medicines as palatable and elegant as possible will add much to the physician's popularity. He should, therefore, pay due regard to making his medicines pleasant in taste, smell, and appearance.

An excipient may be added for mechanical purposes, as when we write:

R—Quininae sulphatis, 2. Gm.
 Opii pulveris, 0.12 Gm.
 Gentianæ extracti, q. s.
 Misce et divide in pilulas XVI.
 Consperege pulvere cinnamomi.

In this prescription the extract of gentian is an excipient to produce a certain consistency; it enables us to make a mass with the other dry ingredients. Some authors say that in such prescriptions the choice of excipient may be left to the pharmacist, but an intelligent prescriber will not leave anything to the choice of another, but will make his prescription perfect and complete by naming every ingredient, excipient not excepted. It is, however, impossible always to state the exact amount of excipient required to make a mass, and the determination of the exact quantity may properly be left to the discretion of the dispenser, provided that the pharmaceutical requirements are such as to permit this without affecting the therapeutical characteristics of the finished product. When the determination of the quantity is left to the pharmacist, this is indicated by omitting mention of a quantity after the ingredient, and writing, instead, the abbreviation *q. s.* (*quantum satis*; name of ingredient in the genitive case). But *q. s.* must never be written when the pharmaceutical requirements do not fix the amount to be used. It would be wrong to use it, for instance, as follows:

R—Quininae sulphatis, ʒ i.
 Yerbæ santæ syrupi, q. s.
 Misce et signa: Tablespoonful every two hours.

If the druggist took 1 fluidounce, the dose of quinine would be 30 grains; and if he took 6 fluidounces, the dose would be only 5 grains; and there is nothing in the prescription to assist him in determining the amount.

An excipient is also used for a mechanical purpose when we order a dry and insoluble powder to be dispensed, suspended in a liquid.

We then add syrup or mucilage to render the liquid viscid, so that the powder will subside but slowly, as in the following:

R—Bismuthi subcarbonatis, ʒ ii.
 Cretæ misturæ,
 Acaciæ syrupi, āā, f ʒ iss.
 Misce.

Such a preparation is often called a "shake mixture," and a label with the direction, "to be well shaken," may be pasted on the vial, just above or below the regular label.

Instead of using syrup or mucilage, we may order powdered gum arabic, which is mixed with the other powders, and then the water or other diluent is slowly added during constant stirring.

The disagreeable taste of many preparations may be greatly improved by the choice of a proper excipient; but taste should not be rendered more agreeable at the expense of efficiency, unless the patient absolutely refuses to take the more disagreeable and active preparation.

The bitter preparations can not be greatly improved by syrups, for the sweetish-bitter taste becomes nauseous to many. Aromatics will usually be better for the purpose.

Alkaline, sour, or salty preparations may be sweetened with syrups. Acrid and pungent substances may be dispensed in mucilages and syrups. Nauseous drugs are rendered more agreeable by the addition of volatile oils, bitters, or aromatics, while insipid medicines may be flavored with aromatic, sweet, sour, or bitter excipients.

Modern elegant pharmacy has enriched our materia medica with many very palatable preparations, such as wine of beef and iron, elixirs of various kinds, syrups, wines, malt preparations, and numerous other combinations in which pleasant flavor, taste, and appearance are united with effectiveness and ready assimilability. Great differences exist in these regards, however, between the preparations of the same name made by different makers, and the physician will do well to use judicious discretion in choosing between them. Many of the preparations of this kind, such as compound elixir of taraxacum, aromatic elixir, elixir of licorice, syrup of yerba santa, etc., are very good excipients to be added to extemporaneous prescriptions; those mentioned here disguising almost completely the disagreeable taste of even as bitter a remedy as quinine.

If quinine is dispensed in a mixture with aromatic syrup of rhubarb, chocolate, licorice, compound elixir of taraxacum, or elixir of wild cherry bark, or with any other excipient, to disguise its taste, no acid must be added, as these substances will not be able in that case to overcome the intense bitterness of the drug.

While attention is paid to taste and flavor, the appearance must not

be neglected. Frequently some coloring substance—for instance, compound tincture of lavender, or compound tincture of cardamom—will give an attractive appearance, where otherwise this might not be so. A patient is usually a very fastidious person, and will take a pleasant remedy much more willingly than one that is repulsive both to the eye and to the taste.

The consergative in prescriptions for pills is really a form of excipient, specified in the prescription in order that the pills may have the same flavor and taste, wherever and by whomsoever they may be compounded. Strictly speaking, a gelatin or sugar coating is also an excipient.

THE DILUENT.

The last ingredient in a complete prescription is the diluent, which has no therapeutical value, and is added merely for mechanical reasons. It is added, as the name implies, to dilute the more active ingredients, and may be either solid or liquid. It is most useful in adjusting doses, making up the desired quantity, or when the dose of the remedy is so small that it can not by itself be weighed out into doses at all, as when we try to divide 1 grain of strychnine into 100 doses. Here, of course, we must add some other ingredient to make the whole bulky enough to allow of division.

R—Morphinæ sulphatis, gr. i.
Sacchari albi, $\frac{5}{8}$ ss (*diluent*).
Misce et divide in pulveres VIII. Signa:.....

R—Morphinæ sulphatis, gr. i.
Glycyrrhizæ pulveris, gr. viii (*diluent*).
Gentianæ extracti, q. s.
Misce et divide in pilulas VIII. Signa:.....

R—Morphinæ sulphatis, gr. i.
Aquæ menthæ piperitæ, $\frac{1}{3}$ i (*diluent*).
Fiat solutio. Signa:.....

In the above three examples we see the use of both liquid and solid diluents, added for the purpose of enabling us to divide 1 grain of morphine into doses of $\frac{1}{8}$ grain each. One powder, 1 pill, or 1 teaspoonful of the solution, each, contain that dose.

The same ingredient often answers both as excipient and diluent, as when we dissolve various chemicals in simple or aromatic elixir, as in the following example:

R—Quininæ sulphatis, $\frac{3}{4}$ i.
Elixir taraxaci compositi, $\frac{1}{3}$ iv.
Misce et signa: Tablespoonful every four hours.

Here the compound elixir of taraxacum answers the double purpose of diluting for ease of administering the doses and as an excipient to

disguise the bitter taste of the quinine, and it will be found more convenient to use the term "vehicle" in a case of this kind.

The determination of the amount of diluent to be added depends upon the number and size of the doses we wish to give. If we determine, for instance, to give twelve doses of 30 grains each of bromide of potassium every two hours, in elixir of orange peel, we will at once see that a teaspoonful dose will not answer our purpose, because the salt can scarcely be dissolved in this small quantity of fluid, and, if it could, it would be too concentrated a solution to taste well. A dessertspoonful—or, still better, a tablespoonful—dose will be more pleasant, and we therefore add enough of the vehicle to the 6 drams of the bromide to make 12 tablespoonfuls or 6 fluidounces, as follows:

R—Potassii bromidi, $\bar{3}$ vi.
 Elixiris aurantii corticis, $f\bar{3}$ vi.
 Fiat solutio. Signa: Tablespoonful every two hours.

This is really a little more than 6 fluidounces, as the dissolved salt occupies some little space; but when the quantity of the salt or other dissolved material is small, we ignore this little inaccuracy, and mention a definite quantity of diluent or vehicle. But when the total bulk of a number of salts, tinctures, and other ingredients is appreciable in quantity, but not readily ascertained, or when, to make an even total volume, the quantity of diluent would have to be expressed in fractions of drams or ounces other than halves, it is preferable not to state the quantity of diluent or vehicle in the prescription, but to write "q. s." after it, as in the following example:

R—Magnesii sulphatis, $\bar{3}$ i.
 Podophylli extracti fluidi, $f\bar{3}$ ii.
 Rhei syrupi, $f\bar{3}$ ss.
 Aquæ q. s. ut ft. sol. $f\bar{3}$ iv.
 M. S.:.....

The more usual form of expressing this is shown in the next form of the same prescription:

R—Magnesii sulphatis, $\bar{3}$ i.
 Podophylli extracti fluidi, $f\bar{3}$ ii.
 Rhei syrupi, $f\bar{3}$ ss.
 Aquam ad $f\bar{3}$ iv.
 M. S.:.....

The word "ad" means that enough of the ingredient be taken "up to" or "to make" the quantity which follows the word "ad." In the above example the epsom salt, fluid extract of mandrake, and syrup of rhubarb are to be placed in the vial, and enough water is then added to make the 4-ounce solution.

As there seems to be a great deal of misunderstanding about the use and meaning of the word "ad," it has been suggested by some to

discard its use in prescriptions altogether, but it would seem to be absurd to drop an exceedingly expressive and convenient term for the purpose of accommodating ourselves to the ignorance of others. A better plan is to use the word only in connection with the abbreviation "q. s.," which would make the last line of the last example read thus:

Aquæ q. s. ad f̄ iv.

Used in this manner, it is hardly possible that any one should misunderstand the meaning of this convenient preposition.

The choice of diluent should never be left to the dispenser, but should always be expressed in the prescription, so that the prescription may always be compounded in exactly the same manner.

COMBINATION OF REMEDIES.

It will prove of great interest and value to the reader to carefully study the classical work of Dr. Paris, entitled "Pharmacologia," but as this work is out of print and very scarce, and, therefore, inaccessible to most readers, no apology is needed for inserting here the following synopsis of the chapter from Dr. Paris' work, which bears the heading, "AN ANALYSIS OF THE OBJECTS TO BE ATTAINED BY MIXING AND COMBINING MEDICINAL SUBSTANCES."

Medicines are combined to achieve different results:

I. TO PROMOTE THE ACTION OF THE BASIS OR PRINCIPAL MEDICINE.

A. *By combining several different forms, or preparations, of the same substance.*

This is of use when the chemical nature of the medicinal substance will not admit of the full solution of all its active principles in any one solvent, and its exhibition in substance is ineligible. Example: *Liquor iodi compositus*, in which iodine and iodide of potassium both are necessary to effect proper solution. *Unguentum iodi* illustrates the same truth.

B. *By combining the basis with substances of the same nature—that is, which are individually capable of producing similar effects, but with less certainty or energy than when in combination with each other.*

Dr. Paris says that Dr. Fordyce first proved that a combination of similar remedies will produce a more certain, speedy, and considerable effect than an equivalent dose of any single one.

A number of examples have already been given. This fact is especially observable in regard to the action of

(a) narcotics;

(b) bitter tonics;

- (c) aromatics;
- (d) astringents;
- (e) emetics (as ipecac with tartar emetic);
- (f) antispasmodics (as valerian with ether);
- (g) cathartics;
- (h) diuretics (as digitalis with acetate of potassium);
- (i) diaphoretics;
- (j) expectorants (as senega with squill).

It is not so advisable in the case of diffusible stimulants, because, by giving them singly, we may economize our resources in lingering diseases. This is also occasionally true in regard to narcotics, enabling us to avoid the continual increase of dose and, possibly, consequent establishment of habit by now and then changing from one narcotic to another.

C. By combining the basis with substances of a different nature, and which do not exert any chemical influence upon it, but are found by experience to be capable of rendering the stomach, or system, or any particular organ, more susceptible of its action.

Examples have been already given, as when tartar emetic in nauseant doses promotes subsequent absorption of quinine, etc. Changes of diet or habits also illustrate this point.

II. TO CORRECT THE OPERATION OF THE BASIS BY OBLVIATING ANY UNPLEASANT EFFECTS IT MIGHT BE LIKELY TO OCCASION, AND WHICH WOULD PERVERT ITS INTENDED ACTION AND DEFEAT THE OBJECTS OF ITS EXHIBITION.

A. By mechanically separating, or chemically neutralizing, the offending ingredient.

Illustrated in deodorized tincture of opium (separation of narcotine and odorous matter).

B. By adding some substance capable of guarding the stomach or system against its deleterious effects.

Instances: Small doses of opium added to emetics will not prevent emesis, but will prevent excessive depression and nausea; mucilages with pungent substances; castor oil with turpentine when given as an anthelmintic; etc.

III. TO OBTAIN THE JOINT OPERATION OF TWO OR MORE MEDICINES.

A. By combining those substances which are calculated to produce the same ultimate effects, although by totally different modes of operation.

Example: Digitalis and acetate of potassium combined in a diuretic draught; opium and ipecac in Dover's powder, etc.

B. By combining medicines which have entirely different powers, and which are required to obviate different symptoms, or to answer different indications.

- (a) exhilarants with tonics;
- (b) antispasmodics with tonics, or narcotics;
- (c) narcotics with excitants (as opium with camphor in paregoric, or opium with capsicum);
- (d) narcotics with mercurial alteratives;
- (e) tonics with purgatives;
- (f) astringents with tonics;
- (g) astringents with diaphoretics (as tincture of catechu with tincture of ipecac and opium);
- (h) astringents with antacids (as chalk mixture with tincture of kino);
- (i) astringents with narcotics (as acetate of zinc with laudanum for injection);
- (j) purgatives with narcotics and antispasmodics (as opium with sulphate of magnesium in lead colic);
- (k) purgatives with excitants and tonics (as ginger with senna, compound extract of colocynth with nux vomica, etc.);
- (l) purgatives with mercurial alteratives (as aloes with calomel);
- (m) purgatives with diaphoretics (not often used);
- (n) diuretics with tonics;
- (o) diuretics with excitants (as squill with carbonate of ammonium);
- (p) diuretics with alterants;
- (q) diaphoretics with tonics;
- (r) expectorants with tonics;
- (s) expectorants with excitants (as senega with carbonate of ammonium or camphor);
- (t) antacids with carminatives, tonics, purgatives, or sedatives;
- (u) antilithics with narcotics, diaphoretics, or tonics.

No rules can be given for these various combinations, but the physician must have a thorough knowledge of materia medica and therapeutics, together with varied experience and good powers of observation, to make the best use of such combinations. Dr. Paris says that a work may give a general idea of the subject, but practice and experience alone give full possession of it.

IV. TO OBTAIN A NEW REMEDY NOT AFFORDED BY ANY SINGLE SUBSTANCE.

A. By associating medicines which excite different actions in the stomach and system, in consequence of which new or modified results are produced.

Example: Opium is narcotic and ipecac is emetic; *pulvis ipecacuanhæ et opii* is diaphoretic.

B. By combining substances which have the property of acting chemically upon each other, the result of which is the formation of new com-

pounds, or the decomposition of one or more of the original ingredients and the development of their more active elements.

Examples: Black wash; yellow wash; solution of citrate of magnesium; etc.

C. By combining substances between which no other chemical change is induced than a diminution or increase in the solubilities of those principles which are the repositories of their medicinal virtues.

Examples: Adding acids to the water when making decoction of cinchona, or acetic acid to solution of acetate of lead.

V. TO AFFORD AN ELIGIBLE FORM.

A. By which the efficacy of the medicine is enhanced.

Example: Subnitrate of bismuth acts better when given in a mixture with mucilage than when given in pill form.

B. By which its aspect or flavor is rendered less objectionable.

C. By which it is preserved from spontaneous decomposition, or any other chemical change.

Examples: Iodide of iron is preserved by the sugar in the syrup; sugar in Vallet's mass; boric or salicylic acids as anti-fermentatives; etc.

Perhaps no man more carefully analyzed the relations of ingredients in prescriptions to each other than did Dr. Paris, and by studying the above abstract from his work in connection with what was previously said, and then practicing by analyzing in like manner the prescriptions on a druggist's prescription file, or in some formulary, the reader may soon acquire a thorough knowledge of the combinations useful in prescriptions.

SUBSCRIPTION AND SIGNATURE.

The *subscription* or instruction to the druggist is generally very simple, as it is presumed that the pharmacist knows his business and does not require minute instructions.

Generally the abbreviations for subscription and signature are written in one line, "M. S.;" the letter "M." (*misce*) implying all the manipulations necessary to compound the prescription, and the letter "S." (*signa*) directing the druggist to label as follows.

Sometimes this abbreviation is written "M. D. S.," which means "*misce, da, signa*" (mix, give, and sign); or, better, "*misce, detur signatura*" (mix, let it be given with the signature).

The *signatura*, or direction for the patient's guidance in using the medicine, should always, if possible, be written in the language best understood by the patient or his attendants, or otherwise in plain English; *never in Latin*. Complicated Latin subscriptions and signatures are obsolete in this country.

Finally, the prescription should contain the name of the physician, his full address and his office hours, that a druggist may consult him if any error should have occurred in writing the prescription.

The methods of writing the subscriptions for special preparations will be considered further on under the appropriate headings.

DOSES.

The dose of a drug, as stated in the works on materia medica, is generally understood to be that quantity which will produce the full effect of the remedy.

The dose of opium, for instance, is stated to be 1 grain, and this is the quantity usually required to produce sleep or to relieve pain in an adult patient. This dose may be given at once, or in divided portions—sometimes called “fractional doses”—at certain intervals, according to the effect required. Opium is better given in full doses if we desire to produce sleep; in fractional doses to relieve pain.

Or, quinine is better given in a full dose as an antipyretic, and in broken or fractional doses as an antiperiodic, or as a tonic.

Some medicines, especially of the class of hæmatics, exert no appreciable effect from the single medicinal dose, and then the frequency of repetition is ordered after the dose, as when we say, the “dose of tincture of chloride of iron is from 10 to 30 minims, which may gradually be increased to 1 or even 2 fluidrams, two or three times a day.” (United States Dispensatory.)

The doses, as given in the books, are for adult males in the prime of life. Females, aged persons, and youths require somewhat smaller doses; children much smaller doses. The condition of the individual will have much to do in determining the dose, as some women may be stronger than some men, etc. Temperament, disposition, idiosyncrasies, condition of pregnancy, lactation, etc., all must be considered, not only in the choice of the medicine, but also in the choice of the dose.

Doses for Children.

Children require considerably smaller doses than adults, but there is no perfectly accurate rule by which to fix the doses for the little patients. The best and most frequently employed rule, which gives approximately good results, is Young’s, and is as follows:

“*Divide the age of the child, in years, by the age of the child plus twelve.*”

If the age is four years, the dose is $\frac{4}{4+12} = \frac{4}{16} = \frac{1}{4}$. The dose of a child of four years is, therefore, one-fourth that of an adult.

Dr. R. O. Cowling's rule is to add 1 to the age of the child in years, and divide by 24. If the child is 3 years old, add 1, which makes 4, and divide by 24, which gives $\frac{4}{24}$, or $\frac{1}{6}$.

Dr. E. H. Clark assumes 150 pounds to be the average weight of an adult and to require the unit of dose. Persons weighing more or less require proportionately more or less medicine at each dose; therefore, divide the weight of the person in pounds by 150 to learn the dose. A person 200 pounds heavy would require $\frac{200}{150}$, or $\frac{4}{3}$, of the ordinary unit of dose. A child 30 pounds heavy would require $\frac{30}{150}$, or $\frac{1}{5}$, of the unit of dose.

Unusually Large Doses.

Occasionally apparently excessive quantities of dangerous remedies are prescribed, as of morphine in the case of opium-eaters, or of opium in cases of delirium tremens or of peritonitis, etc. To avoid delay, on account of justifiable hesitation on the part of the pharmacist to put up such prescriptions, the physician should write the quantity both in Latin numerals and in words, the latter either in English or Latin, in parentheses, thus:

R—Opii pulv., gr. iv (four grains).
 Tart. emetic., gr. ii (two grains).
 Sacch. alb., gr. x.
 M. et div. in pulv. III.
 S.: One powder every hour.

This shows that the large doses are not written by error, but deliberately and knowingly, and the pharmacist would be justified in putting up the medicine unhesitatingly.

Apparently excessive doses may also be designated by placing an exclamation mark in parentheses after the quantity, but care should be taken to write plainly, so that this mark may not be confounded with the Roman numerals. It has been suggested to underscore the large quantity, but this is not a good plan, because the stroke of a "t," in the next line below, may be accidentally written under an unintentionally excessive dose, and may lead the druggist to consider it all right, and an accident may be the result. The first-mentioned method is plainest and, therefore, best.

APPARENT DISCREPANCY IN STATING DOSES.

In a pharmaceutical journal there was published some time ago an article by a pharmacist which presents a subject for consideration that is often ignored or not properly understood. This writer said that pharmacists, not physicians, should fix the doses of pharmaceut-

ical preparations, as they were better acquainted with the percentage strength of the various preparations. This view is held by many pharmacists, and, while it is not the province of these pages to treat at length on this subject, a few words will not be out of place. The above-quoted assertion shows that the writer did not understand the principles that govern the determination of doses, for many questions of therapeutics and pharmacy, besides the mere consideration of percentage proportions, are involved.

In Bartholow's work on *Materia Medica and Therapeutics* the following doses of two preparations of ipecac are given, and the number of grains of the drug contained in each dose is added in parentheses:

Fluid extract of ipecac. Dose: ℥ ii—ʒ i (2—60 grs.).

Wine of ipecac. Dose: ℥ i—ʒ i ($\frac{1}{16}$ —4 grs.).

Any given volume of wine of ipecac contains only about $\frac{1}{16}$ as much of the drug as an equal quantity of fluid extract of ipecac, yet the smallest dose stated is only half as large, or contains $\frac{1}{32}$ as much ipecac as the smallest stated dose of fluid extract, while the largest dose of the wine given by this author is of equal volume as that of the fluid extract, but contains only $\frac{1}{16}$ as much ipecac.

Now, according to the views of the writer mentioned above, this shows lamentable ignorance on the part of Bartholow, and the work of fixing the doses should have been delegated to a pharmacist. That Bartholow knew this difference in strength is shown by his calling attention to it himself; nevertheless he gives the above doses. The truth is, these two preparations are used for entirely different purposes; and, in fact, the difference in action between large and small doses of ipecac is almost as great as if they were two different remedies. Ipecac in large doses (15 to 60 grains) is used as an emetic, or in some cases, and with due precautions, as an anti-dysenteric remedy; in small doses ($\frac{1}{50}$ to 2 or 3 grains) as expectorant and nauseant, and in some intestinal troubles of children. For the emetic effects the fluid extract or powder is used; for the other effects, in cough mixtures, etc., the milder syrup or wine is preferred. We would not waste 2 fluidounces of good sherry wine to give 1 dram of ipecac as an emetic, especially as the dilution would delay the action; and when we do not wish the emetic effects we make the remedy more pleasant with syrup or wine; and the doses of the preparations quoted in the works on therapeutics are the doses an intelligent and educated physician makes use of, for the purposes for which the preparation is best adapted. Numerous similar instances might be quoted, but the above are enough to show that the apparent discrepancies in the doses of different pharmaceutical preparations of the same drug are not due to ignorance of the composition on the part of physicians,

but are based rather on long experience and sound therapeutical knowledge, and an appreciation of these facts enables the physician to choose intelligently from among these various preparations.

Cases have no doubt come to the knowledge of every one in which the patient was treated by one physician for a length of time unsuccessfully, and then promptly recovered under a change of physicians; and yet both physicians used the same remedies. This is often ascribed to "faith," or "imagination," on the part of the patient, and occasionally this may be the explanation, but in most such cases it is due to greater knowledge on the part of the second physician, who, by judicious choice of preparations and doses, is able to produce gradations and modifications of effects of which some physicians and many pharmacists seem to have no idea. A physician may write grammatically faultless prescriptions, and yet fail to produce the desired effects if he has neglected the study of the subject suggested in this paragraph.

PRESCRIBING.

When the physician has carefully examined the patient and arrived at a diagnosis, if such is possible at the time of the examination, the next thing is to determine on a plan of treatment, and to write the prescription. The latter should not be done until after a full examination, as it destroys the confidence of the patient if the physician commences to write the prescription and then throws it aside, half-finished, upon hearing the patient state a symptom not before mentioned. The patient is excusable, under such circumstances, if he thinks the physician hasty and careless, and that he does not fully understand the case; or, if he begins three or four prescriptions before finishing one, it gives the patient the impression that he is ignorant and undecided in regard to the proper treatment; and in either case he need not be surprised if he never sees his patient a second time.

Having determined, as far as possible, the nature of the case, we determine *what* to give. This our knowledge of materia medica and therapeutics enables us to do, and base, adjuvant, corrective or directive, excipient, and diluent are all mentally determined on. Then comes the question, *how*, or in what form, to give. This is by no means a subordinate question, for the efficacy and promptness of our treatment often depends upon the determination of this point.

As a general rule, we may remember that medicines dispensed in a fluid form act most promptly and surely, and in the pill form most slowly, if not most unsatisfactorily. Whenever the powers of assimilation are low or interfered with by the disease, or when the symptoms are urgent, it is folly to give solid preparations, unless they are almost instantaneously soluble in water or in the gastric juice. Powders and pills that require time to dissolve or digest, often lose us

our patients, when the same remedies in fluid form might have saved them. The writer's experience has been that the fluid extracts are usually the best form in which to administer drugs when promptness and certainty of action are desired.

When the remedy may be given in several forms—as, for instance, in solution, pills, or powders—without sacrifice of efficiency, we may give to our patient a choice of these preparations, as individual tastes differ in this regard, some preferring pills or powders, while others prefer solutions.

The next question is, *how much* to give. This, also, depends on many different circumstances. Some remedies are given in a single dose, as emetics, cathartics, etc.; while others, such as tonics, etc., are given in divided doses, more or less frequently repeated. In the latter case we should give such a quantity, that, if the patient takes the remedy according to our directions, it will be sufficient from one of our visits to the next. The number of hours in a day during which a patient will take medicine averages about sixteen, as the other eight hours are consumed in sleep. It is very seldom necessary to rouse a patient to take medicine, as sleep is generally of as much importance as drugs.

Dividing sixteen by the number of hours of interval between the administration of the separate doses, and adding one, we find the number of doses to be given for each day; it is then easy to determine the total number of doses from one of our visits to the next. If we visit the patient on alternate days, and he takes a dose of medicine every three hours, he will take six doses ($16 \div 3 = 5$; $5 + 1 = 6$) in one day; and we will, therefore, prescribe twelve doses at each visit. In such calculations we, of course, ignore fractions.

This calculation is only approximately correct, as the patient may sleep more or less than eight hours, or his tablespoon may contain less than $\frac{1}{2}$ -ounce, etc.; so that we need not be so very exact in this calculation of the number of doses.

It is very much to the disadvantage and injury of the physician if he prescribes large quantities of medicines—for which the patient must pay, of course—and then at the next visit orders the use of the remedy to be discontinued, though scarcely half is taken, and prescribes something else.

It quite frequently happens that a row of half-empty vials and boxes adorns the patient's table, looking, as the patient sometimes expresses himself, "like a small drug store." This is justly regarded by people in moderate or poor circumstances as a waste for which there is no excuse, and which they can illy afford. If the physician dispenses his own remedies, they will suspect him of an effort to increase the bill unnecessarily; or, if he does not dispense medicines himself, they will think he is paid a percentage on his prescriptions

by the druggist. This, of course, no reputable physician will stoop to take, and the pharmaceutical profession have no very flattering opinion of the men who are avaricious and mean enough to ask percentages.

In the struggle for existence only the fittest should survive, and when a physician or a druggist can not exist without receiving or paying percentages he ought to learn a trade, or do something to earn an honest livelihood.

There may not be any improper motive in prescribing too large quantities of medicines, and it may be simply from a want of reflection, or from thoughtlessness; yet the physician who is in the habit of prescribing a fresh remedy before the old is taken will surely suffer in his practice.

Unforeseen symptoms may occasionally arise which will call for a change of remedies, and in such an exceptional case, of course, the above considerations should not prevent us from making the change.

When writing a prescription, we first write the names of the drugs or ingredients in their proper order; for example, when called to prescribe for a child suffering with "summer complaint," and we wish to give powders, each containing 1 grain of mercury with chalk, $\frac{1}{2}$ grain of Dover's powder, 2 grains of subnitrate of bismuth, and 4 grains of sugar—1 powder to be given every two hours, and the visit to be repeated next day—we will write:

R—Hydrargyri cum creta,
 Pulveris ipecacuanhæ compositi,
 Bismuthi subnitratis,
 Sacchari albi,
 Misce et divide in pulveres
 Signa: 1 powder every two hours.

Now, we calculate sixteen hours a day for taking medicine, and two hours interval between doses ($16 \div 2 = 8$; $8 + 1 = 9$); nine doses to be given.

In prescribing powders (or, in fact, any other preparation) it is customary to employ only even numbers to express a number of doses greater than three; we, therefore, give eight or ten doses. Suppose we give ten doses. We write the numeral X after the word pulveres in the subscription, and then multiply the intended dose of each ingredient by ten, writing the quantities thus ascertained after the respective names, and the prescription is as follows:

R—Hydrargyri cum creta, gr. x.
 Pulveris ipecacuanhæ compositi, gr. v.
 Bismuthi subnitratis, gr. xx.
 Sacchari albi, gr. xl.
 Misce et divide in pulveres X.
 Signa: 1 powder every two hours.

We must be careful, however, to write the required quantity of each drug after the name of that drug, *and not after some other name.* Sup-

pose that we intended to give $\frac{1}{40}$ part of a grain of strychnine and 2 grains of quinine in pill form in each pill, it would not be "*quite the thing*" to change the quantities, thus:

R—Strychninæ sulphatis, ℥ iv.
 Quininæ sulphatis, gr. i.
 Mucilaginis tragacanthæ, q. s.
 Misce et divide in pilulas XL.

Such carelessness might lead to very serious results; for, although the above is *perhaps* an exaggerated example, mistakes of this kind do sometimes occur. While the above method of writing a prescription is usually employed, this should preferably all be done and calculated *mentally*, the drugs, together with their order and quantities, being determined before commencing to write. In such a case the prescription is written out in full at once.

When the quantity of any ingredient is near some such weight as a scruple, dram, or ounce, a half-scruple, half-dram, or half-ounce, or some multiple of these quantities, we prefer to use the sign for such quantities instead of the exact number of grains. We also prefer to say ℥ss, rather than ℥iiss, or gr. xxx. The sign ℥ss is chosen rather than ℥iv, etc.; just as we would say *one dollar*, and not *ten dimes*, or *one hundred cents*.

When writing a prescription for any other preparation, liquid or solid, we proceed just as for powders; first determining the drugs, then the number of doses, then the total quantities desired.

Having finished the prescription we carefully read it over, assuring ourselves of the correctness of our doses and calculations, and then we give it to the patient, giving him full oral instructions how to use the medicines, besides ordering plain directions to be written on the label.

Some physicians are in the habit of writing prescriptions in which they designate the ingredients by unusual names, not understood by every pharmacist, thus forcing the patient to go to a druggist who has come to an agreement with the physician in regard to these private formulæ. The patient is thus, perhaps, compelled to go a great distance to a druggist in whom he places no confidence, and who will charge high prices for simple substances because the patient can not have the prescription compounded elsewhere. Such collusions between the druggist and physician are entered into for the purpose of cheating the patient, and such behavior is unprofessional, and parties thereto are guilty of quackery and fraud.

INFLUENCES MODIFYING ACTION OF MEDICINES.

Works on therapeutics give information in regard to many influences which modify the action of medicines and the size of doses, all of which must be borne in mind when prescribing.

We have already referred to age as regulating the sizes of doses. But it also must be considered as regards action of medicines. Opiates and narcotics, cathartics, and many other remedies are either not given to children at all, or only in very small doses, far less in proportion than as ascertained by the rules already given; while, on the other hand, calomel is borne in proportionately larger doses without producing salivation.

The sex of the patient also exerts a great influence on the action of medicines. The general rule that women require smaller doses than men was probably based on an empirical experience, which was afterward formulated by Dr. Clark into a rule, already quoted, according to which the unit of dose is to be given to patients weighing 150 pounds, and larger or smaller doses in proportion to the greater or lesser weight of the patients. As the average weight of women is less than the average weight of men, the average doses for women are also less; but a definite rule, applicable to individual cases, has never been formulated, and probably can not be formulated. Some authors, however, have stated that neurotics, or nerve remedies, and cathartics, especially if of the gastro-intestinal irritant class, must be given with greater caution to women than to men.

Perhaps much of the difference of the action of medicines, as exerted upon persons of different sexes, is due less to the sex than to the different habits of women and men. As a rule, men use liquors, tobacco, spices, sauces, and other stimulating articles of food or drink to a much greater extent than women do; the latter generally preferring more insipid or simply sweet food and drink. Therefore, when we prescribe remedies to affect the nerves or alimentary canal, the man, who is used to the habitual stimulation of these organs, will not be affected by the same doses that would probably act violently on most women. The habits of the individual, therefore, have a greater modifying effect on the action of medicines than the sex. Habit, indeed, may enable a person to consume immense quantities of some drugs, as we see in the tolerance of opium, arsenic, and other remedies, in those who are addicted to these vicious "habits." The long-continued use of almost any remedy will accustom the patient to its use, and necessitate continually increasing doses, unless the use of the remedy is occasionally discontinued.

The time of day when to administer medicine is sometimes of importance. Thus, most cathartics should be given late at night, so that they may commence and finish their expected action during next day. It is not advisable to disturb the sleep of the patient, or compel him to get out of bed to go to the closet, as by so doing he may "take cold," and more mischief than good may follow the use of the remedy.

Many remedies may irritate an empty stomach which would be

easily borne on a full stomach, or at least before the meal is totally digested. Cod-liver oil is better tolerated when taken with a meal than when taken on an empty stomach. Of course, such remedies as pepsin, alkalies, acids, etc., given before or immediately after meals to influence the digestion of the food, would do little or no good if given when the stomach is empty. Generally, large doses of most medicines are best given two or three hours after meals; cathartics, narcotics, and hypnotics in the evening; saline purgatives and diuretics, especially in the form of mineral waters, in the morning; etc.

The season of the year also influences us in the choice of remedies and doses. In winter, for example, when much larger quantities of more solid diet are taken, we can give larger doses of cathartics than in summer, when more vegetable and fluid substances are ingested, and most persons are inclined to suffer from the summer diarrhœas.

Similar considerations influence treatment as practised in various climates and zones, and on individuals of different races. The influence which race has on the action of medicines is not as much dwelt on as the subject probably demands. We know that there are peculiar exemptions from some diseases, as well as peculiar susceptibilities in regard to others, on the part of different races, and even of different people, and it is but fair to suppose like differences of susceptibility to the action of medicinal agents. The effect of alcoholic liquors on the Indians of North America is well known, as is also the extent of the opium-eating habit among Mongolian people. It seems to be a fact that the higher civilized and cultivated races, as well as individuals, require and tolerate greater amounts of nerve-stimulants (alcohol, etc.), while the use of narcotics (opium, hasheesh, etc.) is more extensively practiced by the so-called "half-civilized" nations; the apparent exception to this—namely, the increased use of opium, hydrate of chloral, chloroform, cocaine, etc., in civilized countries or communities, in recent times—is directly traceable to the perhaps well-meant, although ill-judged and often fanatical prohibition and total-abstinence movement, which is unintentionally forcing a greater curse on the country than the one it is trying to suppress.

Individual idiosyncrasies produce quite exceptional conditions, which no physician can foretell, but the possibilities of which must not be lost sight of in prescribing. For instance, a single dose of mercury will salivate some persons; or of iodine will produce cutaneous eruptions and coryza; or of quinine may cause choleraic symptoms, or, as in a recently reported case, extensive desquamation of the skin; a small dose of opium may produce mania, or excessive narcotism; etc. On the other hand, in other patients and under other conditions, very large quantities of medicines may be given. Instead of being a personal idiosyncrasy, this may be only a consequence of

the particular disease; as when we give immense doses of opium in peritonitis, or apparently enormous quantities of hydrate of chloral in delirium tremens.

INCOMPATIBLES.

By "incompatibility" in a prescription we mean that the combination of certain substances or remedies is objectionable or impossible; and this incompatibility may arise from various reasons.

We may classify cases of incompatibility under four headings:

I. MECHANICAL INCOMPATIBILITY.

II. ORGANOLEPTIC INCOMPATIBILITY.

III. CHEMICAL INCOMPATIBILITY.

IV. THERAPEUTICAL INCOMPATIBILITY.

A thorough knowledge of materia medica and chemistry is necessary to avoid the error of combining incompatible substances in the same prescription, and the physician should carefully study this part of materia medica in the works on that subject. It is probably impossible to make a list which would be of much value, as the list could not be memorized, and reference to it when perhaps the patient is looking on, or when away from home on a visit to the patient, is, of course, out of the question. We will, therefore, confine ourselves in this place to the consideration of the general facts only, leaving it to the prescriber to apply these facts to the individual characteristics of the remedies he desires to give.

Considering, first, then, *mechanical incompatibilities*, we find that there are many remedies which we can not bring into as homogeneous union as would be desirable, but that the resulting mixture would soon separate again. Tinctures containing iodine, volatile or fixed oils, balsams, oleo-resins, resins, resinoids, and similar substances form precipitates when they are added to water, and these precipitates often adhere so persistently to the sides of the vial that shaking will not loosen them, and the liquid that might be poured from the bottle would contain little or none of the medicinal ingredients.

Often, in cases of this kind, we may correct the trouble by making the menstruum in our prescription more alcoholic by adding either plain alcohol or one of the alcoholic liquors; provided, of course, that the use of alcohol is not counter-indicated by the condition of the patient

Many cases of mechanical incompatibility may be corrected by proper pharmaceutical manipulation, or processes, as when we cause the precipitate to be a light, flaky one, by adding the tincture slowly to water during constant trituration, or perhaps by adding syrup instead of water alone, thus suspending the resulting precipitate and making a

“shake mixture;” or, when we emulsify an oil by means of acacia or yolk of egg, and thus overcome an apparent mechanical incompatibility.

Mechanical incompatibility is least likely to do actual harm to the patient, but it is most apparent to the pharmacist, who is often annoyed by combinations that defy his utmost skill in dispensing. The right of the pharmacist to alter the prescription under such circumstances is limited, and the prescription, if really not compoundable, should be referred back to the physician for correction. A merely trifling change—such as the substitution, in a prescription for pills, of one excipient which will make a mass for another which was prescribed and will not make a mass—may, of course, be permitted.

Organoleptic incompatibilities are such as result in medicines, offensive to sight, taste, or smell. Reference to the methods of correcting some of these errors by means of excipients has already been made when speaking of the latter. Certain mixtures are so disagreeable, however, that we should avoid them altogether, if possible; for instance, tincture of aloes in a mixture is rarely prescribed now, aloes being almost always administered in pills.

Preparations containing tannic acid produce such unsightly mixtures with iron salts and solutions that we generally avoid the combinations.

Examples of *chemical incompatibility* are quite plentiful. Two or more substances may be added to each other, and unite to form a new compound; or, by double decomposition, several new compounds, which may be entirely different from the original substances prescribed. Such resulting compounds may be insoluble and inert; or they may be exceedingly active or even poisonous; or they may have therapeutical or physiological effects which are totally different from those which the prescriber desired.

It is generally stated that alkaline hydrates or alkaline carbonates should not be mixed with acids. While this is generally true, yet the resulting salts may be just what we want to give, as in the “neutral mixtures,” or “saturations;” as when we order carbonate of ammonium and benzoic acid “*ad saturationem*,” so that the solution contains benzoate of ammonium, or as in solution of citrate of ammonium.

As a rule, alkaline hydrates and carbonates should not be added to soluble alkaloidal salts, as the latter may become decomposed, precipitating the often insoluble alkaloid. This, while it generally does not detract from the activity of the alkaloid, gives rise to the danger that the last dose may contain an excessive amount of the alkaloid and produce serious results which would have been avoided by the retention of the alkaloidal salt in solution. Metallic salts should not be

given with alkaline hydrates, carbonates, chlorides, sulphides, etc., because precipitates may result; as nitrate of silver with chloride of sodium, or calomel with lime-water. Even to this rule there are exceptions; for calomel with lime-water gives us "black wash," while corrosive sublimate with lime-water forms "yellow wash," both of which are valuable remedies.

It will be seen from the above that there are many cases of chemical incompatibility which can not be objected to on therapeutical grounds; that, in fact, many of these "incompatible" combinations are valuable from a therapeutical standpoint, and that it is, therefore, impossible to give general rules as to which combinations may or may not be used. This will depend on the ingredients, and each prescription must be considered individually.

There are, however, some chemically incompatible mixtures which must never be prescribed—namely, those in which decomposition may take place violently, or with explosive force.

The most dangerous combinations that are likely to occur in prescriptions are those of chlorate of potassium, permanganate of potassium, bichromate of potassium, chromic acid, or concentrated mineral acids, with easily oxidizable organic substances.

We should avoid giving chlorate of potassium with tannic acid, glycerin, sugar, sulphur, hyposulphite of sodium, etc. Chlorate of potassium will explode violently with many other substances, either upon trituration or spontaneously, but some of these mixtures are extremely unlikely to be prescribed; as chlorate of potassium with sulphide of antimony, picrate of ammonium, picric acid, etc.

Nitrate and permanganate of potassium may explode with the same substances which are dangerous with chlorate of potassium.

Nitric acid may produce spontaneous combustion or explosion with turpentine or other oils; or some of the concentrated mineral acids, as sulphuric and nitric, may produce the same result with simple syrup. We should, therefore, make it a rule to prescribe chlorate or permanganate of potassium only in solution, and, as far as possible, without other ingredients except water; as it may occur that the vial is left uncorked, and the water evaporates, in which case the residue might explode. Chlorate of potassium troches, ignorantly carried loose in a pocket which contained matches, have produced violent explosion. Mineral acids should not be prescribed in a concentrated form, but only diluted. A safe plan is to prescribe no combinations which are unusual, without first studying the results that may possibly occur; and, if explosive or poisonous compounds may be formed, we should, of course, avoid them.

In dispensing, we must recollect that many substances, such as vapors of ether or alcohol, lycopodium dusted in the air, etc., are in-

flammable, and, with air, form explosive mixtures. It is true these are not spontaneously inflammable, but require the presence of a flame to ignite them; but at night a physician requiring an anæsthetic will prescribe chloroform, and not ether, on account of the danger of igniting the vapor of the latter.

To consider *therapeutical incompatibilities* at any length is outside of the scope of these pages, and we must refer to those works on materia medica and therapeutics which treat at length on the physiological action of medicines. By therapeutical incompatibility is meant an antagonism in action, so that one ingredient of the prescription acts as an antidote to another. Such antagonisms are not infrequently met with, sometimes even in official preparations, as in the case of tincture of conium, in which the alcohol is an antidote to the conium, and to a certain extent interferes with the proper action of the drug. A combination of opium with cathartics would ordinarily be considered incompatible; yet, in lead colic, a solution of sulphate of magnesium with tincture of opium is found in practice to be a very valuable combination.

Belladonna (or its alkaloid, atropine) is a physiological antidote to opium, and is used in cases of opium poisoning. Opium is a powerful depressant of the heart's action, while atropine, in proper doses, is a most energetic heart stimulant. Both, in excessive doses, are narcotic poisons. Notwithstanding the above-mentioned physiological antagonism or incompatibility, it is found in practice that a combination of the two remedies produces anodyne and hypnotic effects, without the danger of narcotic poisoning from either. It appears, therefore, even in regard to physiological incompatibility, that experience or empiricism teaches us that there may be exceptions; and we may do well to remember that there can not be any positive rules in regard to this whole subject of incompatibility, but that we must study the characteristics of the individual drugs in this, as well as in all other regards.

Another subject, somewhat related to chemical incompatibility, is that concerning the *changes of color* produced by various combinations in our prescriptions. It is important to think of the possibility of such changes—not so much, perhaps, because they can affect the value of the medicines, but rather because a want of knowledge in this regard may lead us to express or form erroneous and unjust opinions as to the correctness of compounding, and our own ignorance may cause us to do injustice to some able pharmacists.

Lessing gave the following examples of color changes, in his work on materia medica. Sulphurous acid, chlorine water, or any preparation containing free chlorine or bromine, may bleach organic colors contained in syrups, tinctures, etc. Sunlight, or strong alkalies, or

acids, may have a similar effect. Bromine and iodine, however, may change some of the colors to yellow, brown, or blue.

Red vegetable colors become brighter with acids, or change to an orange tint, while alkalies often change them to brown or green; metallic salts sometimes precipitate them.

Yellow vegetable colors become darkened upon adding alkalies; acids have comparatively little effect, while metallic salts may make them paler.

Orange or brown vegetable colors are affected similarly to the red or yellow colors.

Green vegetable colors change to yellow with acids, and to yellowish-brown with alkalies.

Blue and violet vegetable colors generally become reddened with acids, and brown with alkalies. Litmus is an exception, it becoming blue with alkalies.

These changes of color are most apparent in solutions, although some of them are noticeable in powders, etc.; as when we mix rhubarb with alkaline carbonates, or with anise oil.

They are unimportant, except as already explained, and a change of color will not deter us from prescribing any otherwise desirable combination.

SPECIAL PREPARATIONS.

In the remaining pages of this book we will consider the application of the foregoing general principles to the prescribing of special preparations, such as pills, powders, solutions, etc. The physician should aim to write his prescriptions in such complete form, including the designation of the comparatively unimportant excipients, diluents, consergatives, etc., that the medicine will be exactly of the same appearance, taste, and smell, no matter how often, or by how many different pharmacists the prescription may be compounded. Medicines may be dispensed in solid or liquid forms, and of these we will consider the following:

Solid.

Species (teas).

Pulvis (powder in bulk).

Pulveres (powders).

Confectiones (confections).

Trochisci (troches).

Pilule (pills).

Suppositoria (suppositories).

Unguenta (ointments).

Cerata (cerates).

Emplastra (plasters).

Chartæ (papers).

Liquid.

<i>Solutiones</i> (solutions).	<i>Misturæ</i> (mixtures).
<i>Saturations</i> (neutral mixtures).	<i>Emulsiones</i> (emulsions).
<i>Infusa</i> (infusions).	<i>Enemata</i> (injections).
<i>Decocta</i> (decoctions).	<i>Linimenta</i> (liniments).

SPECIES (*Species, ierum, f., pl.*).

These have already been considered in former pages. They are prescribed by enumerating the ingredients, and writing either *concisus, a, um* (cut), or *contusus, a, um* (crushed), after the names of the vegetable substances, according to the nature of the drug, thus:

R—Hyoseyami concisi, $\frac{3}{8}$ ss.
 Lini farinæ, $\frac{3}{8}$ viii.
 M. ft. spec. S.:

It must be recollected that teas, cataplasms, baths, pillows, etc., are prescribed and dispensed as "species." The subscription for these preparations is simple: *M. ft. spec.* (*misce et fiant species*, mix and let species be made.)

The signature should give explicit directions for the use of these species; for instance:

Make a poultice of it.

A handful in a quart of boiling water to make tea. Drink freely.

Boil 2 handfuls in 3 gallons of water; when cool, use as sponge bath.

Boil in 1 gallon of water; strain; when cool, use as injection.

Sew in a muslin bag, and apply warm to cheek.

For a dry pillow, to apply to cheek, about 1 or 2 ounces of species is required. Cut narcotic herbs are usually mixed with cut chamomile, elder flowers, or hops as diluents; or we order only the active species, and direct in the signature to mix with a certain quantity of bran or corn meal.

When dry heat is to be applied to an extensive surface, as to the abdomen, from 3 to 10 ounces of species may be required for the sack or pillow; if chamomile or hops forms the bulk of the species, less is needed than if corn meal forms the bulk, about twice or three times as much of the latter being required as of the former lighter substances.

Poultices may be made from linseed meal, corn meal, bread crumbs, or powdered slippery elm bark, with hot water or milk. They may be made anodyne by adding narcotic herbs to the species; or tincture of opium, or fluid extract of belladonna, henbane, or conium, to the poultice; cooling or soothing, by adding solution of subacetate of lead; stimulating, by adding powdered mustard to the species, or sprinkling turpentine on the prepared and folded poultice; deodorizing by add-

ing vegetable charcoal to the species; or disinfectant by adding carbolic acid, etc., to the poultice. When fluids are to be added to the poultice, these are prescribed separately and dispensed in vials as solutions.

For a medium-sized poultice, the bulk of which consists of linseed meal, about 4 ounces of species will suffice, and we give the attendants verbal instructions to mix this with about $\frac{1}{2}$ pint of boiling water, to make a stiff paste, which is to be folded in a thin piece of muslin and applied to the skin, so that one thickness of the muslin intervenes between it and the poultice mixture. To apply a poultice direct to the skin is a filthy and otherwise objectionable practice, as the subsequent cleaning of the skin is troublesome and oftentimes positively injurious. It is customary to prescribe two pillows or two poultices, so that one may be warmed while the other is applied.

The quantity of species required for a bath depends in part on the character of the drugs. For a bath for full immersion, for an adult, about 2 pounds of species are required; less, of course, for a bath for children. For a sitz-bath, foot-bath, or sponge-bath, $\frac{1}{2}$ pound of species will usually suffice. The bath is directed to be prepared by boiling the required amount of species in a few gallons of water, allowing to stand for ten or fifteen minutes, straining, and then adding to the water in the tub. The whole bath should then be brought to the proper temperature before the patient is placed in it.

The *cold bath* should have a temperature of about 20° C. (68° F.). It is seldom medicated.

The *tepid bath*, or *lukewarm bath*, should be from 24° C. (75° F.) to 35° C. (95° F.), or somewhat less.

The *warm*, or *hot bath*, is from 35° C. (95° F.) to 41° C. (106° F.).

The lukewarm and hot baths are frequently medicated.

Never allow the boiling medicated decoction to be added to the bath after the patient is already in it; thoughtless attendants have occasionally scalded patients to a fearful extent in this manner.

The mustard bath is to be made by filling a tub with warm (not hot) water to the desired depth; from 1 to 4 ounces of mustard is tied in a piece of muslin, and, after soaking, is alternately squeezed and soaked until its virtues are imparted to the water. The patient is then placed in the bath, and the cloth with mustard is used like a sponge for rubbing the skin. When the surface is sufficiently reddened, the patient is taken out, dried quickly, folded in a sheet and blanket, and laid in bed. If the mustard is thrown loosely into the water, countless particles will remain adherent to the skin, and each one will continue to smart and burn, and thus completely destroy the soothing effects of a properly prepared mustard bath.

If the species are to be used for inhalation, about 2 ounces are

thrown into a quart of boiling water, and the patient inhales the rising steam and vapors, but from a safe distance, so as not to scald himself. The steam may be kept up for some time, either by occasionally throwing hot pebbles into the water or by setting the vessel on the stove, avoiding active ebullition. Such inhalations of vapor of chamomile, hops, tincture of henbane; belladonna or opium, of tar, creosote, etc., or even of water alone, often give great relief in colds, catarrhs, influenza, bronchorrhœa, bronchitis, and other similar troubles.

POWDERS

are dry drugs divided into small particles which are easily movable upon each other. They may be of different degrees of fineness, but the only kinds used in prescriptions are those of impalpable fineness.

The following drugs are fit for administration in powder form:

1. Drugs too bulky for pills, as carbonate of magnesium, etc.
2. Insoluble drugs, as calomel or calcium phosphate.
3. Drugs incompatible in solution.
4. Vegetable extracts and blue mass, when dry.
5. Drugs very bitter or nauseous in solution.
6. Almost all salts, and alkaloids and their salts.
7. Soft or even liquid substances, if incorporated with a proper quantity of absorbing vegetable powder or sugar.

The following kinds of substances are not well adapted for administration in powder form:

1. Nauseous drugs, as asafetida.
2. Deliquescent salts.
3. Salts containing much water of crystallization, unless previously dried, as sulphate of iron.
4. Very volatile substances, as musk, camphor, etc.
5. Soft extracts or extract-like substances.
6. Acrid substances, as carbonate of ammonium.

To these general statements some exceptions may be noted. Nauseous or volatile drugs, for instance, may be given in wafers or gelatin capsules; or volatile substances may be dispensed in waxed paper, and soft substances may be mixed with dry vegetable powders, etc.

Powders may be dispensed in bulk, the dose being measured out with some approximate measure; or in divided doses, each dose folded in a separate paper.

POWDER IN BULK (*Pulvis, eris, m. or f.*).

When the dose of the powder exceeds 20 or 30 grains, it is best prescribed in bulk, with sugar as a diluent. It should be dispensed in a

wide-mouthed bottle or in a paper box, and the dose is measured, when wanted, with a teaspoon or other appropriate measure.

For the purpose of approximating the doses, powders may be classified:

Light: Magnesia and vegetable powders; teaspoon contains 7 to 30 grains.

Moderately heavy: Resins, gums, sugars, sulphur, and the lighter salts; as alum, chlorate of potassium, chloride of ammonium, cream of tartar, etc.; teaspoon contains from 30 to 60 grains.

Heavy: Metallic oxides and salts (rarely given in bulk); teaspoon contains from 60 to 120 grains.

The teaspoon is supposed in these cases to be moderately heaped; if only level full, it contains about half as much.

The method of prescribing is shown in the following example:

R—sennæ pulveris,
Potassii bitartratis,
Sulphuris loti, āā, $\frac{3}{4}$ i.
Zingiberis pulveris, $\frac{3}{4}$ i.
M.; ft. pulv. S.:

The subscription in this case may be simply *M.* (*misce*, mix) if all of the ingredients are already in fine powder; or, if any of the ingredients are in lumps or crystals, as follows: *M.; ft. pulv.* (*misce; fiat pulvis*—mix; let a powder be made).

We may add to this, *d. in scatul.* (*detur in scatula*; let it be given in a paper box), or *d. in vitro* (*detur in vitro*; let it be given in glass), if for any reason we find it necessary to do so.

The following medicines are most frequently given in this form: *Mixtures of powders containing pepsin, subnitrate of bismuth, etc.*, for dyspeptics; *charcoal, magnesia, phosphate of lime, carbonate of lime, cubebs, cream of tartar, sulphur, lupulin, powdered senna, etc.*

Sugar is usually added as a diluent, and may be flavored with a volatile oil, when it is called "oleosaccharum," thus:

R—Bismuthi subnitratis, $\frac{3}{4}$ ss.
Oleosacchari menthæ piperitæ, $\frac{3}{4}$ iiss.
M.; d. in vitro. S.:

This means that volatile oil of peppermint shall be added to the sugar in the proportion of about 1 drop for every dram (or, according to some, for every scruple), and then be thoroughly mixed. The whole is ordered to be dispensed in a glass vial, because the oil of peppermint is volatile and might evaporate from a paper box.

It may be recollected that with 20 grains of one of the light powders there can be mixed,

of an extract of pill consistence to 6 grains;
of an ordinary extract to 4 grains;
of a balsam or oleo-resin to 4 drops;

of a volatile oil.....to 4 drops;
and of a watery substance, if the powder is insoluble in
water,..... ..to 2 grains;

With an equal quantity of a moderately heavy powder only half as much of the above substances can be incorporated.

The above method of prescribing powders in bulk is not very accurate in dosing, and is useful only when substances are to be given for a long time and when the doses need not be very exact.

POWDERS IN DIVIDED DOSES (*Pulveres*, m. or f., pl.).

When accuracy in dosing is necessary, the powders are divided into exact doses, each of which is folded in a small piece of paper, called *chartula*. The contents of such a paper should weigh from 4 to 10 or 15 grains, and when the dose is much smaller than 4 grains, some inert powder is added as a diluent, for ease of division. This diluent is generally sugar or sugar of milk; but other substances, as aromatic powder, etc., are also used.

In writing the prescription, the whole quantity of each drug is written; the ingredients are directed to be mixed, and then to be divided into the desired number of doses.

R—Opil pulveris, gr. ii.
Acidi tannici, $\frac{3}{5}$ ss.
Sacchari albi, $\frac{5}{2}$ i.
M. et div. in pulv. XII. S.:

This form of subscription, *Misce et divide in pulveres* — (mix and divide into — powders), is very simple, yet explicit, and therefore sufficiently complete.

Other formulæ may be employed, of which the following are, perhaps, most common.

M. et div. in part. aeq. — (*misce et divide in partes aequales* —, mix and divide into — equal parts); or, instead of the term *part. aeq.*, the term *chart. (chartulas, papers)*, or *dos. (doses, doses)*, may be written.

M. et ft. pulv.; div. in chart. — (*misce et fiat pulvis; divide in chartulas* —, mix and let a powder be made; divide into — papers), is a form of subscription especially adapted to prescriptions with one or more of the ingredients in the form of lumps or crystals or in any form other than a powder.

After the word *misce*, in any of the above formulæ, the word *et* is generally omitted, although it would be better to retain it.

Powders are sometimes prescribed thus:

R—Opil pulveris, gr. $\frac{1}{6}$.
Acidi tannici, gr. iiss.
Sacchari albi, gr. v.
M. et ft. pulv.; d. tal. dos. XII.

Misce et fiat pulvis; dentur tales doses XII (mix and let twelve such powders be given). This subscription means that twelve powders are to be given, each (*talis, e, adj.*) powder containing the quantities named in the prescription. In this case, the dispenser multiplies the quantity of each ingredient by the number of powders stated in the subscription, to ascertain the total quantity which he must weigh out. This method it is not advisable to adopt, as it adds another chance for error in dispensing.

A very common error, which should be carefully guarded against, is to write the subscription thus: *M. ft. pulv. No. III.* This form of subscription does not make it clear whether the druggist shall divide or multiply the quantities named in the subscription, and, while he would generally guess correctly, it is, nevertheless, only a guess in each case. *M. ft. pulv.* is correct when only one powder is ordered, but when two or more powders are prescribed, it should be *div. in pulv.*, instead of *ft. pulv.* The word "No." is superfluous. We do not say "divide into number three powders," nor did the Romans.

If the powders contain a volatile substance, they may be wrapped in waxed papers, which are prescribed by adding to the ordinary subscription the formula, *d. in chart. cerat.* (*dentur in chartulis ceratis*, let them be given in waxed papers).

Or, to disguise the taste of disagreeable medicines, they may be prescribed in gelatin capsules, by adding *d. in capsul. gelatin.* (*dentur in capsulis gelatinatis*, let them be given in gelatin capsules), or, in wafers, *d. in chart. amyli* (let them be given in starch wafers).

Some physicians prefer to write in plain English, "Put up in capsules," or, "in wafers," to which there is no serious objection.

The patient may be directed to take soluble powders in water or milk, etc., or insoluble powders in more viscid liquids, as in syrup; or he may place the dry powder on the tongue and gulp it down with a mouthful of water.

If the powders have been put up in capsules or wafers (the latter also sometimes called "cachets"), these are dropped into a glass or cup containing a large tablespoonful of water, milk, coffee, or other fluid. In a moment, when the entire surface has been moistened and softened, the whole contents of the glass or cup is swallowed at one gulp, without breaking the wafer or capsule.

Or the patient may be instructed to put up his medicine in a wafer, himself. Wafers may be bought either round or square. One of these is dipped edgewise into water, so as to wet its whole surface, and is then laid on a large, previously wetted, tablespoon. The powder, pill, or bolus, is then laid on the wafer; and then first one edge is folded over, then the opposite, to overlap the first; then the ends; after which the spoon is filled with water or milk, and the whole swallowed at one gulp.

With care, even castor or cod-liver oil can be inclosed in a wafer in this manner, and swallowed without any perception of taste.

CONFECTIONS (*Confectio, onis, f.*).

This class of preparations is occasionally useful to make disagreeable remedies more palatable, especially for children. Powders are mixed into a paste with honey, preserves, fruit, jellies, or syrups, any one of which may be prescribed *q. s.*, the amount necessary to be taken being left to the judgment of the dispenser.

Soluble powders, such as salts or sugar, are not appropriate for administration in this form, unless the quantity of insoluble powders in the prescription is largely in excess.

Official confections are prescribed by writing the name and the quantity merely. Extemporaneous prescriptions for confections enumerate the powders or other ingredients, and, lastly, an excipient to make the mass.

R—Santonicae pulveris, $\frac{3}{4}$ i.
 Jalapae pulveris, $\frac{3}{4}$ ss.
 Rosae confectionis, q. s.
 M. et ft. confect. S.:

(*Misce et fiat confectio*, mix and let a confection be made.)

Confections are sometimes divided into conserves (*conserva, æ, f.*), and electuaries (*electuarium, i, n.*), the first being made by mixing dry sugar with a moist vegetable substance, the second by mixing dry vegetable powder with a moist or liquid saccharine substance. It is unnecessary to make the distinction in the subscription.

PILLS (*Pilula, æ, f.*).

In order to make pills, it is necessary to make a mass of a doughy consistence, small portions of which can be rolled into a round shape, which they should retain, neither flattening nor becoming brittle and crumbling by age.

As the size of the pill is limited to an average weight of 2 to 6 grains, and as a patient usually does not like to take more than half a dozen for a dose, we can not well give drugs in pill-form when the dose exceeds 15 to 20 grains.

Deliquescent salts should not be prescribed in pill-form; neither liquid substances, unless the dose is very small; as carbolic acid, creasote, or croton oil.

The following drugs are suitable for administration in pill form (mainly after Parrish):

1. *All drugs suitable to be given in powder*, if the dose is small enough.

2. *Resins and balsams*, which may be made into a mass by adding soap or other excipient. Copaiba can be warmed with its own bulk, each, of powdered cubeb and yellow wax; and, when melted and well mixed, the mass resulting on cooling may be rolled out into pills.

3. *Substances, the action of which is to be retarded*. On the other hand, medicines designed to act promptly must not be given as pills.

4. *Insoluble substances, too heavy to be given in mixtures*. These may also be given in powder.

5. *Disagreeable or nauseous substances*. These are very pleasantly disguised in pills, especially in the coated varieties; they may also be given in powders, which can be dispensed in capsules or wafers.

6. *Vegetable extracts and blue mass*. When vegetable extracts are too soft, it may be necessary to add some inert vegetable powder, as powdered marshmallow root, to make a sufficiently dry mass.

7. *Volatile oils and oleo-resins* may be made into pills with the proper excipients, but they are better given in capsules.

In prescribing pills it is necessary to have some adhesive substance to allow the making of a mass. Often the base becomes adhesive upon the simple addition of a few drops of water; or an adjuvant or corrective may be indicated which is itself adhesive or becomes so with a small quantity of water.

R—Nuc. vomic. extr., gr. v.
 Belladonn. extr., gr. viii.
 Colocynth. extr., comp., $\frac{3}{4}$ i.
 M. et div. in pil. XXX.

When water alone will suffice, as in this prescription, to make a mass, this is not usually expressed in the prescription. The same prescription, however, would be better written:

R—Nuc. vomic. extr., gr. v.
 Belladonn. extr., gr. viii.
 Colocynth. extr., comp., $\frac{3}{4}$ i.
 Aquæ q. s. ut ft. mass.
 M. et div. in pil. XXX.

The simplest subscription being best, provided it is explicit enough, the formula *M.; div. in pil.* —, is preferred by the writer. Of course, the direction *misce; divide in pilulas* —, implies in the word *misce*, the making of a mass, as otherwise it could not be divided into pills.

In the last example of prescription, above, it is really only necessary to write *aquæ q. s.*, as the additional remark, *ut fiat massa*, is necessarily implied in the subscription.

A common form of the subscription is *M.; ft. mass.; div. in pil.* — (*misce; fiat massa; divide in pilulas* —, mix; let a mass be made; divide into — pills); or, *M.; ft. mass. in pil.* — *div.* (*misce; fiat massa in pilulas* — *dividenda*, mix; let a mass be made, to be divided into — pills).

The defective forms of subscription already condemned for powders are still more frequently used for pills: *M.*; *ft. pil. No.* —, or, *Ft. pil.* — (sometimes abbreviated to *Mfpil.* —). *No.*, for number, is superfluous; *ft. pil.* — is appropriate when 1 pill only is to be made; otherwise it is always preferable to write, *divide in pilulas* —.

The following list of excipients for pills is mainly after Remington:

Water—used only when the ingredients of the pill possess sufficient adhesiveness to be developed by the water.

Syrup—similar to water; a little more adhesive.

Syrup of acacia—more adhesive than simple syrup; pills are apt to become hard in time.

Mucilage of acacia—more adhesive than the last.

Glycerin—a little of it in a pill prevents the pill from becoming hard.

Glucose—colorless; adhesive, very generally useful; best excipient for quinine.

Honey—similar to glucose; not colorless.

Extract of malt—similar to glucose; not colorless.

Glycerite of starch—more adhesive than glycerin alone; does not allow the pill to dry out hard.

Glycerite of tragacanth—similar to above; more adhesive.

Confection of rose—useful when we want to increase bulk of mass.

Crumb of bread—useful to make pills from such liquids as croton oil, volatile oils, carbolic acid, etc.

Powdered althæa—added to give proper pill consistence to soft extracts, etc.

Soap—with resins.

Resin cerate—valuable for oxidizable substances, etc.

Cacao butter—for permanganate of potassium pills and similar substances.

Petrolatum—same as above.

Vegetable extracts—solid extracts of couchgrass, dandelion, gentian, etc., form good masses with vegetable powders and quinine.

In choosing the excipient, it may be remembered that resins are often best made into a mass with powdered soap and water. If much of vegetable powders is in the prescription, any of the mucilages will do right well; or honey, syrup, confection of rose, or one of the above-named extracts; glucose makes a good mass with quinine; some resins are easily made into a mass with alcohol, but the pills are apt to flatten unless some vegetable powder is added.

After a little study of the nature of the medicines, the proper excipient can readily be chosen, and should always, if possible, be named by the physician. As he can not always determine the exact quantity

necessary to form a mass, it is customary to prescribe "q. s." of the excipient, thus:

R—Acid. arsenios., gr. ii.
 Quin. sulph., $\frac{3}{5}$ ss.
 Extr. gentian., q. s.
 M. et div. in pil. XXX.

If all of the medicinal ingredients of a pill-mass are resinous, resinoid, or extractive substances, the pills are apt to flatten; and, therefore, it is well to add for each pill from $\frac{1}{6}$ to $\frac{1}{2}$ a grain of powdered licorice root, or of some other vegetable powder, the fibers and cell-walls of which afford mechanical support and maintain the globular form of the pill. The quantity should be written in the prescription by the physician, as this addition affects the size of the pills.

As a general rule, a small addition of licorice root, not enough to materially increase the size of the pill, together with extract of gentian, will make a good pill-mass; and, in fact, this *extract of gentian is one of the most generally useful pill excipients*.

When it is desirable to make pills from a very small quantity of medicine, as when we desire to make 60 pills from 1 grain of strychnine, the prescription requires three ingredients—the *base* (just mentioned); a *diluent*, or powder, to increase the bulk and enable us to divide the base into doses, and an *excipient* to cause the other ingredients to adhere or form a mass. These subordinate ingredients of the mass should be mentioned in the prescription, as it is desirable that the prescription should be so complete that the pills made according to it will always have the same size and color, thus:

R—Strychninæ sulphatis, gr. i.
 Glycyrrhizæ pulveris, gr. xv.
 Glycyrrhizæ extracti pulveris, gr. xx.
 Aquæ, q. s.
 M. et div. in pil. LX.

As a diluent, the physician may prescribe starch, aromatic powder, powder of licorice root, cinnamon, or marshmallow, or any other medicinally inert powder.

But no prescription for pills is quite complete unless the *conspervative* is also mentioned, and, as the color and taste of an extemporaneously prescribed pill depends almost altogether on the adhering powder, this should always be designated by the physician; and it will be in this matter, as in so many others, that a judicious choice and variety will avoid the appearance of mere routine in prescribing pills. This *conspervative* is written after the subscription, or rather, it is the concluding part of the subscription:

R—Quin. sulph., gr. xl.
 Oleoresin. piper., gr. v.
 Ferri redact., gr. xx
 Extr. gentian., q. s.
 M. et div. in pil. XX.
 Consperge lycopodio. S.:....

Here the direction, *consperge lycopodio* (sprinkle or strew with lycopodium), directs that when the pills are being cut and rounded they shall be rolled in lycopodium to prevent adhesion. Aromatic powder, cinnamon, marshmallow or licorice root powders, etc., are good conspergatives for dark-colored pills, while a mixture of starch and powdered sugar, or lycopodium, answers better for light-colored pills. A prescription for pills, written with proper diluent and excipient, and with the conspergative mentioned, will, of course, necessarily cause pills of the same size and appearance to be put up whenever and however often it may be compounded.

Formerly, before sugar-coated and gelatin-coated pills were in use, it was the habit, frequently, to order pills to be gilded or silvered. This may be prescribed by writing, instead of *consperge lycopodio*, as in the above example, as follows:

Obduc. fol. auri (*obducantur foliis auri*, let them be covered with leaves of gold), or *obduc. fol. argenti* (of silver).

Probably, theoretically, the most promptly active and reliable pills are extemporaneously prepared and uncoated pills, when made from fresh, first-class ingredients by a competent dispenser. But in the actual practice of the present time, the finest and most accurately made pills are well-finished gelatin-coated pills, made on the large scale by reliable manufacturers. The gelatin-coated pill must be still soft while it is being coated; and the coating, which is of extreme thinness, dissolves readily on the tongue, swelling, as it does so, and rendering the pill so slippery that it is readily swallowed; and, as the coating is either tasteless or sweet, the disagreeable taste of the pill-mass is entirely disguised.

The coating being also perfectly transparent, the peculiar color of the pill-mass is clearly shown, and, therefore, mistakes from substitution are less liable to occur, and the appearance of routine prescribing is avoided by the great variety in the size and color of the pills.

Ready-made gelatin-coated pills are prescribed, either by writing the maker's name for the pills, together with the abbreviation of the manufacturer's name, as in the following example (O-W.L. standing for the name of the maker, the *Oldberg-Wall Laboratory*):

R—Pil. quininae, phosphori et ferri, O-W.L., xxiv.

or by writing the manufacturer's formula, thus:

R—Quininæ sulphatis, gr. i.
Phosphori, gr. 1/100.
Ferri carbonatis massæ, gr. i.

In pil. I.

D. tal. pil. XXIV (O-W.L.).

This subscription, *dentur tales pilulas viginti et quatuor* (O-W.L.), means, let 24 such pills, of Oldberg-Wall Laboratory's make, be given.

If the firm whose name is mentioned makes pills with only one kind of coating, it is not necessary to designate the coating in the prescription. Otherwise the style of coating is usually specified in English, in parenthesis, after the number of pills.

When the physician prescribes ready-made, coated, or "proprietary" pills, as in the last example above, by enumerating the active ingredients instead of merely the name of the pills, it is of course unnecessary to state either the diluents or excipients, as these are not under the control of the dispenser. But this remark applies only when the name of the manufacturer is mentioned, as otherwise the pills, as dispensed by different pharmacists, may present great diversity of appearance.

The *bolus* is simply a very large oval pill, 10, 15, or more grains in weight. Boluses are prescribed exactly like pills, merely substituting the abbreviation *bol.* for *pil.* in the subscription. They are usually taken in wafers or gelatin capsules.

TABLET, LOZENGE, OR TROCHE (*Trochiscus, i. m.*).

Usually round, oval, or octagonal discs, punched out of a mass, like pill-mass, which is rolled out much in the same manner as pastry dough, and then dried. They are rarely prescribed to be made extemporaneously, but are ordered by designating one of the official or commercial varieties, and the number desired; thus:

R—Trochiscos sodii santoninatis XII.
S.:.....

Occasionally it may be necessary to prescribe troches extemporaneously, and, if so, the mass is ordered similar to pill-mass, and the subscription is *M. et div. in trochisc.....* (*misce et divide in trochiscos.....*, mix and divide into.....troches).

As the troches must be dried, they can not be made so as to be dispensed on short notice, and this may be the reason why they are so seldom prescribed extemporaneously.

SUPPOSITORIES (*suppositorium, i. n.*).

Suppositories are medicines incorporated with oil of theobroma, formed into conical shape, and intended for rectal administration, either for local or general effect. Occasionally suppositories are used for introduction into the vagina or urethra, but these are rarely prescribed extemporaneously; proprietary articles of this kind are usually called for and dispensed, and these are often made with gelatin.

The Pharmacopœia directs that, unless otherwise prescribed, each suppository shall weigh 15 grains, or 1 gram. The prescribing is therefore, very simple. After writing the names and quantities of the active ingredients, add oil of theobroma to make the total mass weigh as many times 15 grains as the number of suppositories desired, thus:

R—Extr. opii aquos., gr. iii.
 Acid. tannic., gr. xviii.
 Ol. theobromæ, q. s. ad $\frac{2}{3}$ iss
 M. et div. in supposit. VI.
 Consperge lycopodio.

The conspergative (usually lycopodium or starch) should be mentioned, as some druggists are in the habit of packing suppositories in cotton, the fibers of which often are difficult to remove, and may produce irritation.

PLASTERS (*Emplastrum*, *i. n.*).

Plasters are hard when cool, but become adhesive at the temperature of the body. They are usually spread on muslin, chamois skin, sheepskin, adhesive plaster, or other suitable fabric, warmed and applied to the surface of the skin, either for local effect in skin diseases or sometimes for effect on deeper lying organs.

Ordinary lead or adhesive plaster, "surgeons' plaster," is used for giving mechanical support in the treatment of injuries, fractures, dislocations, etc.

Plasters may occasionally be prescribed by weight (about 10 grains for every square inch of surface to be covered), but they are generally prescribed to be of a certain size—thus:

R—Emplastrum belladonnæ, 4"x 6".
 Sig.: For external use.

These figures, accompanied by the sign for inches, mean of course a plaster, 4x6 inches in size.

CERATE (*Ceratum*, *i. n.*).

Less solid than plasters; designed for use as dressings on lint, charpie, muslin, etc. They are generally prescribed by weight, and dispensed in gallipots. Sometimes, as in the case of cantharidal cerate, they are prescribed like plasters—by size. In an extemporaneous prescription for a cerate, various substances may be ordered to be mixed with simple cerate as the vehicle or diluent. The subscription is *M. et ft. cerat.* (*misce et fiat ceratum*, mix and let a cerate be made).

If all the ingredients are already cerates, as when a more active cerate is ordered to be mixed with simple cerate to reduce its strength, the prescription is simply *M.* (*misce*, mix).

OINTMENT (*Unguentum, i. n.*).

Softer than cerates; melt at the temperature of the body, by friction. They are designed for inunction. They are prescribed precisely like cerates, simply using the abbreviation *ungt.*, instead of *cerat.*

PAPERS (*Charta, æ. f.*).

There are three of these preparations official in the Pharmacopœia. In two, *charta cantharidis*, and *charta sinapis*, one side of a sheet of paper is coated with appropriate preparations containing the respective medicinal agents; while in the *charta potassii nitratis*, bibulous paper is saturated with nitrate of potassium.

The first two are intended for external application, and are prescribed like plasters, by size, or, as they frequently are kept in pieces of about four inches square, by number. They are usually, however, in rolls, and the proper size can be cut off.

The patient, or his attendants, must be instructed to moisten the mustard paper by dipping in lukewarm water before applying it.

The nitrate of potassium paper is cut in strips, which are ignited and allowed to burn without flame, and the vapors are inhaled by asthmatics.

LIQUID PREPARATIONS.

In dispensing fluid medicines, it is necessary to bear in mind the sizes of vials in use, so that these may be filled. The physician should so arrange the quantities in his prescriptions that the liquid is not too much for one size of vial and too little for the next sizé, but just the right quantity for one or another.

He must remember, therefore, that $\frac{1}{2}$, 1, 2, 3, 4, 6, and 8-ounce vials are employed for prescriptions. The next sizes are 10, 12, 16, 24, and 32-ounce sizes, which are, however, rarely employed for prescriptions.

Vials of blue or black glass are often employed to dispense remedies for external application, the color of the vial, with the customary conspicuous red color of the label, being an additional safeguard against mistakes and accidents.

Blue vials are often used to dispense solutions of nitrate of silver, with a view to prevent the action of light upon such a preparation. But a moment's thought will show the uselessness of this practice, for blue glass transmits the chemical or actinic rays of light, and therefore, offers no protection to this sensitive solution. Bottles of a deep orange-yellow ("amber") glass are now used for the above purpose; and, as this glass obstructs the passage of actinic rays, these

vials are very appropriate for all solutions and preparations liable to be injured by the action of light.

When we desire to have any preparation dispensed in a blue or black vial (the druggist uses these indiscriminately), we state in our subscription, *d. in vitr. nigr.* (*detur in vitro nigro*, let it be given in a black glass).

A yellow vial would be ordered *d. in vitr. flav.* (*flavus, a, um*, yellow).

OFFICIAL, OFFICINAL, AND PROPRIETARY LIQUID PREPARATIONS.

If it is desired to prescribe any of these preparations without any admixture, this is of course readily done by merely writing the name and quantity, thus:

R—Tinct. ferri chlorid., f ʒ i.
S.:.....

or, if proprietary, by adding the initials of the makers,

R—Extr. ergot. fl., O-W.L., f ʒ ii.
S.:.....

or if the preparation is usually put up in bottles of a certain size, it is best to write:

R—Liq. magnes. citrat., lagenam i.

or, if proprietary, adding the initials of the makers,

R—Extr. multi comp., O-W.L., lagenam i.

Lagena is a Latin word, meaning bottle. Instead of one bottle of solution of citrate of magnesium, *12 fluidounces* may be prescribed; but as this preparation must be put up in "citrate of magnesia bottles," which hold just this quantity, neither more nor less may be prescribed to be dispensed in one bottle.

In regard to prescriptions for so-called proprietary medicines, it may be stated that, while of course any quantity less than a full bottle may be prescribed, it is not always good policy to do so, as the druggist, in order to secure himself against loss, must often charge almost as much for the less quantity as for the whole bottle, and it is therefore more economical for the patient, and also often more agreeable to the pharmacist if the prescriber orders the whole bottle, if possible.

When only one fluid preparation is ordered in the prescription, without any additions, no subscription is necessary; but if two or three different kinds, all fluid preparations, are ordered in the same prescription, the subscription is *M.* (*misce*, mix).

If, however, one or more of the ingredients of the prescription for

a fluid preparation are solid, or such as will not mix readily with the other ingredients, then the subscription is not always so simple, and the method of prescribing may also be more difficult.

SOLUTIONS (*Solutio, onis, f.*).

By a solution we mean a fluid preparation, consisting of one or more solid substances dissolved in water, with or without the addition of acids, alcohol, or glycerin. To this may be added other liquids, as syrups, tinctures, fluid extracts, etc. A solution is a clear or moderately clear liquid, without any undissolved floating particles or sediment; the whole of it could pass through a filter. Occasionally the addition of some ingredient may cause a slight opalescence without destroying its character as a solution.

The solution may vary in color from watery clearness and limpidity to a very deep and almost opaque color.

R—Quininæ sulphat., ʒ ss.
 Acid. sulph. dil., q. s.
 Syr. aurant., f ʒ i.
 Aquæ puræ, f ʒ iii.
 M. et ft. sol. S.:.....

In such a prescription the subscription is simply *Misce et fiat solutio*, mix and let a solution be made.

When the solid substance requires a special solvent, as in the case of quinine, the solvent (acid, in this case,) should be mentioned in the prescription. Occasionally we meet such prescriptions:

R—Quininæ sulphat., ʒ i.
 Syr. toltan., f ʒ ss.
 Elix. tarax. comp., f ʒ iiiss.
 M. et ft. sol. S.:.....

Opinions differ as to the proper method of dispensing this preparation. On the one hand, it is maintained that the subscription directs a solution to be made, and that this can not be done without an acid; that, therefore, the acid should be added, although it is not mentioned in the prescription. On the other hand, it is argued that the evident intention of the prescriber is to disguise the taste of the quinine with the elixir; and, as this object would be defeated by the addition of an acid, the subscription should be disregarded and no acid be added. The writer holds the latter opinion, and thinks that the intention of the prescriber should be carried out as far as possible; but the prescriber should not write *ft. sol.* when the ingredients will not make a solution, and when he evidently did not want a solution; or he should prescribe the necessary solvents, if he actually desired the solution to be made. In the above example there is, therefore, an error in either case, no matter what was the prescriber's intention; either an omission in the inscription, or a wrong subscription.

In this example, the solid substance, together with its special solvent, is so small in bulk in proportion to the total quantity, that its bulk may be entirely ignored in calculating the quantities of the fluids; and the syrup has such a simple relation to the total quantity that the amount of diluent required is easily determined and also easily written in simple terms.

Frequently, however, this is not the case. The other ingredients make such an odd volume that the remainder, which must be filled up with diluent, is also so odd an amount that we can not well write it, even when we may readily ascertain how much it should be. Or, it may be that there are a number of solid ingredients, of which we do not know the volume they will occupy in the solution, and, therefore, can not calculate the exact amount of diluent to be added. In such cases, it is customary to write the preposition *ad* after the name of the diluent, and then the total quantity which it is desired to dispense. Thus we write as follows:

R—Opii tincturæ, f ℥ ss.
 Valerianæ tincturæ, f ℥ iii.
 Syrupi tolutani, f ℥ vi.
 Aquam puram ad f ℥ iv.
 M. et ft. sol. S.:.....

In this case, the quantity of diluent required to make 4 fluidounces would be 2 fluidounces and $6\frac{1}{2}$ fluidrams. Instead of writing this odd quantity we obtain exactly 4 fluidounces, and thereby secure exact dosing, in the manner described.

One drawback to the above prescription is, that it will not always be dispensed in the same manner. This, it is true, is not the fault of the prescriber, but of the dispensers. One of the regular "old-reliable" stock questions for the "Queries and Answers" columns of the pharmaceutical journals is, "what does *ad* mean in prescriptions?" Many druggists would *add* 4 fluidounces of diluent.

The writer has, therefore, been in the habit of writing in a somewhat modified manner:

R—Magnes. sulph., ℥ i.
 Acid. sulph. dil., f ℥ i.
 Syr. acid. citric., f ℥ i.
 Aquæ q. s. ut ft. solut. f ℥ vi.
 M. S.:.....

This can not well be misunderstood; *aquæ quantum satis ut fiant solutionis fluiduncias sex* (water enough to make 6 fluidounces of solution). Instead of this, some would write in this prescription, "*aq. q. s. ad f ℥ vi.*" which is also not likely to be misunderstood. "*Aq. ut ft. f ℥ vi.*" is still another method of writing the same thing.

Although it is not customary to do so, yet it might be a good plan to write all prescriptions for solutions, mixtures, and other similar

preparations in which a diluent is used, in the manner just indicated, to make up a certain total quantity. We would then avoid all calculations as to the amount of diluent necessary, and would insure more correct dosing.

The gargle (*gargarisma*), eye-wash (*collyrium*), injection (*injectio*), wash or lotion (*lotio*), etc., are all solutions, and are prescribed as such.

NEUTRAL MIXTURES (*Saturatio, onis, f.*).

These are solutions of an alkaline substance in water, neutralized or saturated with an acid. Usually carbonates are thus dissolved, and the carbonic acid gas liberated is partly dissolved in the water, and the resulting mixtures are rendered grateful to the patients thereby; this is especially the case when the stomach is rebellious as in cholera morbus, in which complaint the following mixture usually controls the vomiting and purging quite promptly:

R—Potass. bicarb.,	ʒ i.
Acid. tartar.,	
Aquæ, āā q. s. ut ft. saturat.	f ʒ iiiss.
Adde	
Morph. sulph.,	gr. i.
Tinct. valerian.,	
Syr. sacchari, āā	f ʒ ii.
M. S.:	Tablespoonful every hour.

In prescriptions of this kind, it is not to be supposed that the physician will always remember the precise quantity of acid necessary to exactly neutralize or saturate the base, and he therefore writes *q. s.* after the name of the acid. The form used above for prescribing a saturation extemporaneously may be easily remembered:

R	.....(base; with quantity.)
	.....(acid.)
Aquæ, āā q. s. ut ft. saturat.	.....
Adde	.....

M. S.:	.....

Any base, acid, and additions can be inserted in any quantities, but the form remains the same. In fact, with but very slight change, this form answers also for infusions, decoctions, and emulsions, as explained further on.

We may also write the same prescription in another manner:

R—Potass. bicarb.,	ʒ i.
Acid. tartar.,	q. s.
Morph. sulph.,	gr. i.
Tr. valerian.,	
Syr. sacchar., āā	f ʒ ii.
Aquæ, q. s. ad	f ʒ iv.
M.:	ft. saturat. S.:

But this is not as well written a prescription as the other.

INFUSIONS. (*Infusum, i, n.*).

Made by steeping vegetable substances in either hot or cold water, then straining. Leaves, soft parts of plants, or substances containing volatile principles, may be made into infusions; and, to the infusion, other substances may be added.

It is a habit of many physicians to prescribe infusions without mentioning the amount of drug to be used in making them. The Pharmacopœia directs that in such cases, when there is no official formula, the strength shall be 1 part of drug for 10 parts of infusion, or 10 per cent strength. It is better, however, in all cases to prescribe the exact amount of drug from which a certain quantity of infusion is to be made.

R—Digitalis concis.,	ʒ ss.
Aquæ, q. s. ut ft. infus.	f ʒ liiss.
Adde	
Potass. acetat.,	ʒ ii.
Syr. sacchari,	f ʒ ss.
M. S.	

The general outline of the prescription for a neutral mixture is here easily recognized, modified but very slightly to adapt it to infusions.

DECOCTIONS (*Decoctum, i, n.*).

Made like the infusion, except that the drug is boiled with water for some time, then allowed to cool, and strained.

Decoctions are prescribed in the same manner as infusions, only changing *infus.* to *decoct.* in the formula for the prescription or in the subscription. Hard parts of plants, roots, rhizomes, woods, barks, etc., are made into decoctions, rather than infusions, when a preparation of this kind is desirable. Both of these preparations are, however, very infrequently prescribed at the present time, other more effective preparations, such as fluid extracts, deserving preference in most cases.

MIXTURES (*Mistura, æ, f.*).

The mixture is not, as the term is sometimes understood, a mixture of various substances, but it consists of some insoluble substance which is merely suspended by aid of viscid excipients in the diluent in which it is dispensed. The United States Pharmacopœia makes no distinction between a mixture of an insoluble powder or of an oil with water. We restrict the term "mixture" to the preparations of the former kind, and use the term "emulsion" for the latter, thus making two classes of the mixtures of the Pharmacopœia.

The mixture, according to this definition, is merely a liquid in

which an insoluble powder has been suspended, and such a preparation requires to be shaken before taking, as the powder soon settles to the bottom as a sediment. The official *mistura cretæ* is an example of this class of preparations.. Quinine, subnitrate of bismuth, and other preparations, are often prescribed in the form of mixtures.

R—Quininæ sulphat., gr. xxx.
 Elix. tarax. comp., f $\frac{3}{4}$ iv.
 M. S.:

The subscription is merely *M.* (*misce—mix*). It may be *Ft. mist.* (*Fiat mistura*, let a mixture be made) as well; but it must not be *M. ft. mist.*, as we would have here an inelegant tautology.

Sometimes the subscription is written "*M. Ft.*," (*misce, fiat*), which is of course absurd, as *ft.* must always be followed by the name of the preparation to be made.

All the ingredients are written according to the usual order (base, adjuvant, etc.), and this is therefore a very easy preparation to prescribe. It is somewhat different with the other form of mixture, more properly designated as

EMULSIONS (*Emulsio, onis, f.*).

Emulsions are preparations in which oils, oleo-resins, balsams, resins, camphor, etc., are suspended in water by means of an excipient, which is sometimes termed the emulsifier, or emulgent (*emulgens, entis, n.*).

We have already referred to the two kinds of emulsions, differing in the mode of preparation, which have been designated as *true* and *false* emulsions.

The true emulsion is one in which the drug contains both the oil and the emulgent, as in the official *mistura ammoniaci*, *mistura amygdalæ*, and *mistura asafetidæ*.

Several seeds furnish true emulsions on being crushed and triturated with water; as, for instance, sweet almond seed, poppy seed, and hemp seed. Emulsions made from these seeds have little or no medicinal value, and are generally used as demulcent vehicles for other more active remedies of an acrid nature.

A prescription for an emulsion is best written according to the general plan already suggested for neutral mixtures, infusions, and decoctions:

R—Sem. papaveris, $\frac{3}{4}$ ss.
 Aquæ, q. s. ut. ft. emuls. f $\frac{3}{4}$ iii.
 Adde
 Morph. sulph., gr. 1.
 Syr. amygdalæ, f $\frac{3}{4}$ i.
 M. S.:

Instead of writing *adde*, as in above formula, some write *cola et adde* (strain and add). It is self-evident, however, that such preparations must be strained, and to say *adde* alone is, therefore, sufficient. This remark applies also to infusions and decoctions.

The false emulsion is a more commonly employed form of emulsion, and consists of the substance to be emulsified, suspended in water by means of powdered acacia, yelk of egg, or some other emulgent. To the emulsion other substances may then be added, but when acacia is the emulgent, we can not add much alcoholic preparations, as the alcohol coagulates and precipitates the gum, and thereby destroys the emulsion.

The form of prescription is similar to the above:

R—Copaibæ, f ʒ i.
 Acaciæ pulveris,
 Aquæ, āā q. s. ut ft. emuls. f ʒ ivss.
 Adde
 Spir. æth. nitros.,
 Tinct. lavandul. comp., āā f ʒ i.
 Syr. toltutan., f ʒ i.
 M. S.:.....

By memorizing the following scheme, and merely writing in the proper ingredients and quantities desired, no difficulty will be experienced in prescribing emulsions:

R.....
 Acaciæ pulveris,
 Aquæ, āā q. s. ut ft. emuls.....
 Adde

 M. S.:.....

For instance:

R—Ol. morrhæ, f ʒ ii.
 Acaciæ pulveris,
 Aquæ, āā q. s. ut ft. emuls. f ʒ vi.
 Adde
 Tinct. opii camph.,
 Syr. pruni virg., āā f ʒ i.
 M. S.:.....

Or,

R—Chloroformi, f ʒ i.
 Ol. olivæ, f ʒ iii.
 Acaciæ pulveris,
 Aquæ, āā q. s. ut ft. emuls. f ʒ iii.
 Adde
 Syr. scillæ,
 Syr. toltutan., āā f ʒ ss.
 M. S.:.....

Chloroform may readily be dispensed by mixing with two or three times its own volume of best olive oil, and then emulsifying the oil with powdered acacia, as if there were no chloroform. The demulcent properties of the emulsion disguise the pungency of the chloroform excellently.

There are, of course, other methods of prescribing emulsions; by simply enumerating the ingredients, for example, and using a proper subscription, thus:

R—Ol. ricini, f ʒ ss.
 Mucilag. acaciæ, f ʒ iss.
 Syr. sacchar., f ʒ ss.
 Aquæ menth. ppt., f ʒ iss.
 M. et ft. emuls. S.:

This is a common, but poor method of prescribing emulsions, as it implies the use of an inferior method of making the emulsion. It would be better to write as follows:

R—Ol. ricini, f ʒ ss.
 Syr. sacchari, f ʒ ss.
 Mucilag. acaciæ,
 Aquæ menth. ppt., āā q. s. ut ft. f ʒ iv.
 M. et ft. emuls. S.:

This is better, inasmuch as it leaves the determination of the exact quantity of acacia necessary to emulsify to the dispenser, and the resulting emulsion will probably be good in proportion as the ability of the dispenser is so.

RECTAL INJECTIONS (*Enema, atis, n.*).

These are very rarely ordered in prescriptions when desired as laxatives merely, in which case verbal instructions how to prepare them are usually given to the attendants.

It is different, however, when it is desirable to introduce medicines in this manner, on account of inability to administer *per os*, as in extreme sensitiveness of the stomach, stricture of œsophagus, etc.

Enemas for the administration of medicines or food, *per rectum*, should be small, 1 or 2 fluidounces at most, if possible, and the medicines should be dissolved in water, from which they are absorbed much more readily than from mucilage or starch paste. Enemas may be larger if intended for local effect, as when infusion of quassia is used to wash out thread-worms from the rectum. Injections are usually prescribed as solutions.

LINIMENTS (*Linimentum, i, n.*).

A mixture of oily, alcoholic, or other substances intended for external application, with friction. There is nothing peculiar about writing prescriptions for liniments.

They are often a mixture of incongruous ingredients which will not become homogeneous, even on shaking. Nevertheless, they may be very effective in this form, but require shaking immediately before use. Pharmaceutically, liniments rarely are elegant preparations.

In prescribing, we enumerate the ingredients, and say in the subscription—*M. et ft. liniment.*, mix and let a liniment be made.

Sometimes external applications, resembling lotions or liniments, are to be applied with a camel's-hair brush. It has been suggested to call them *pigmenta*, or "paints," but as they are often colorless, it would be preferable to apply to them an old term, *littus*, or *litus, oris*, n. (from the Latin verb *lino*, 3, to besmear). It is true that this term was formerly mainly applied to solutions which were used with the probang to paint the tonsils or fauces, but the term would be equally appropriate for the preparations now called *pigmenta*.

REPETITIONS (*Repetitio, onis, f.*).

A few words may be added in regard to repetitions. When a pharmacist dispenses any prescription, he places on the vial, box, gallipot, or other container, a label having, in the upper left hand corner, the number of the prescription, according to his file, and on the same line, to the right, the date on which the medicine was dispensed.

If we desire the prescription to be repeated exactly in the same manner, we copy this number and date, and order, for example, as follows:

Repete No. 32,517, d. 17, VIII, '87.

Or we may mention the character of the preparation, thus:

Repete misturam 5,689, datam 13, IV, '87.

Or,

Repet. præscr. pro pil., No. 7,430, d. 25, VII, '87.

The adjective *datus, a, um*, or its abbreviation *d.*, means "given," and the last example would be, in English, "repeat the prescription for pills, No. 7,430, (which was) given on July 25, 1887."

It is almost superfluous to state that such an order for a repetition must necessarily be sent to the same pharmacy in which the original prescription was compounded, and where it is on file.

Often, however, it is preferable to rewrite the prescription, even when precisely the same medicines are to be given, and to make some alteration in regard to the flavoring tinctures or syrups, so as to give the preparation a different appearance, taste, or smell. The use of variety in this regard may often disguise a most flagrant routine practice, or, when a remedy must be continued for a great length of time, in chronic or incurable troubles, prevent impatience and dissatisfaction on the part of the patients and their friends.

CONCLUDING REMARKS.

After we have finished writing a prescription, we should lay it aside for a few minutes, while we give directions in regard to diet and general management.

Everyone has experienced the facility with which an error, once made, will be repeated, unless the mind has been occupied in the meantime with some other subject. When, in adding a column of figures, we once say, $7 + 5$ is 13, we are apt to make this error again and again, unless we change and add from above downwards, instead of from below upwards, when the mistake will probably be found. Book-keepers, in taking a trial-balance, sometimes have a trifling error of a few cents, which may elude detection for hours, until the tired accountant goes to bed discouraged and disgusted. Next day, when the mind is rested, the error is often noticed after a few minutes' search, and one wonders how it was possible that he did not see it the evening before.

A similar experience may happen to the prescriber. He makes an error in the dose of some important ingredient, perhaps, and although he reads the prescription over several times he notices nothing wrong. If he lays the prescription aside for a few moments, during which he gives his attention to another subject, and then reads the prescription over once more, as if it were a stranger's prescription that he desired to criticise, he will almost surely discover the error and avert an accident to his patient, and serious injury to his own reputation.

NEVER DELIVER A PRESCRIPTION TO THE PATIENT BEFORE HAVING CAREFULLY AND CRITICALLY EXAMINED IT, AND BEING SURE THAT EVERYTHING IS CORRECT.

One word more:

KEEP A CASE BOOK.

It is a good plan to keep a record of all our cases, for easy reference. For instance, a patient may be affected with a trouble from which he has sought relief from other physicians in vain, until our "superior knowledge," (!) or, perhaps, a fortunate accident, has enabled us to give the appropriate remedies. If we make no record of his case, file no prescription, then, when he comes to have the medicine or prescription repeated, we may have forgotten all about it, and it is just as likely as not that we do not succeed a second time in giving such prompt relief.

For this and other reasons, it is advantageous to keep a record, or case book. This may be a book with printed examination formulæ, or

simply a blank book, in which we make the necessary memoranda of symptoms and treatment.

If we have such a case book, it is a history of our therapeutical experience; a record of our cases, which will enable us to learn and profit from our successes as well as from our failures; it will aid us in taking a prominent rank in our profession; to be welcome members and speakers in our societies; or, perhaps, instructive and respected teachers in our institutions of learning.

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